

CHEMISTRY

FOR

Senior Secondary School

2



Practice Questions and Answers

EDUBASE

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QUESTIONS

TOPIC: CHLORINE AND ITS COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. To test for chlorine _____ is used.

- A. damp litmus paper and bromine paper
- B. damp litmus paper and hydrogen sulphide
- C. damp litmus paper and starch-iodide paper
- D. none of the above

2. The following are physical properties of chlorine except _____

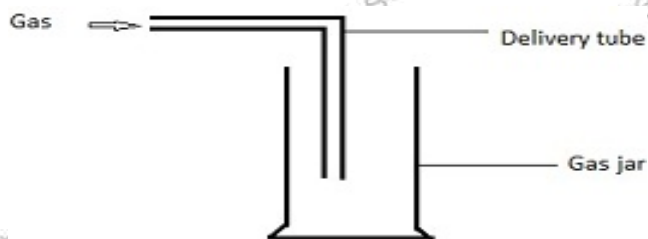
- A. it cannot be liquefied.
- B. it is denser than air.
- C. it is sparingly soluble in water.
- D. it is poisonous.

3. Which of the products of these mixtures is acidic?

- A. HCl(g) + chloroform.
- B. HCl(g) + water.
- C. HCl(g) + Zn .
- D. HCl(g) + Mg .

Use the diagram to answer the question.

4. Which of the following gases can be collected by the set-up diagram illustrated?



- A. H_2 .
- B. HCl .
- C. NH_3 .
- D. N_2 .

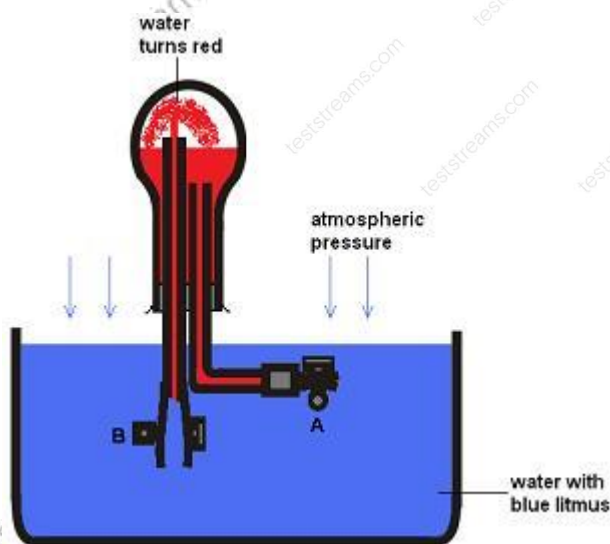
5. Why is a damp blue litmus paper placed at the mouth of a jar during the preparation of hydrogen chloride?

- A. To determine the effect of the gas on the litmus paper
- B. For the litmus paper to absorb the gas.
- C. The litmus paper has no effect in the experiment.
- D. To determine when the jar is full.

6. What reagents are used to test for soluble chlorides?

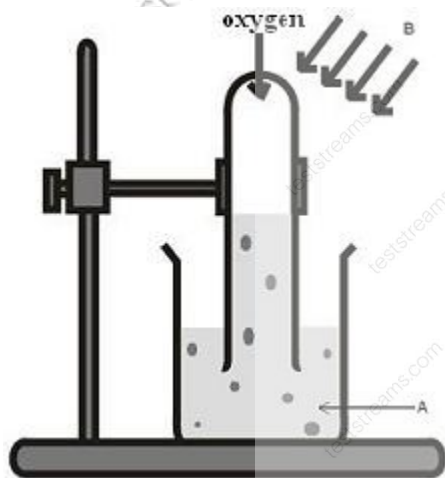
- A. Ammonia.
- B. Acidified silver trioxonitrate.
- C. Acidified lead (II) trioxonitrate.
- D. Ammonia, acidified silver trioxonitrate and acidified lead (II) trioxonitrate.

7. The diagram drawn is called _____



- A. a simple Frasch experiment
- B. a fountain experiment.
- C. a simple contact experiment.
- D. a simple solvay experiment.

8. The diagram drawn is an illustration to show _____



- A. the effect of chlorine on water.
- B. the effect of phosphorus on chlorine.
- C. the effect of chlorine on hydrogen sulphide.
- D. the effect of sunlight on chlorine water.

9. Apart from HCl, which other common gas is used in the demonstration of fountain experiment?

- A. H_2S .
- B. SO_2 .
- C. NH_3 .
- D. C_2H_2 .

10. Chlorine is a common bleaching agent. This is not true with _____

- A. wet litmus paper.

- B. printer's ink.
- C. wet pawpaw leaf.
- D. most wet fabric dyes.

11. Which option is the correct decreasing order of reactivity of halogens?

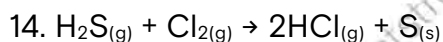
- A. $F_2 > Cl_2 < Br_2 > I_2$.
- B. $F_2 > Cl_2 > I_2 > Br_2$.
- C. $F_2 < Cl_2 < I_2$.
- D. $F_2 > Cl_2 > Br_2 > I_2$.

12. Which of the following statements about chlorine and iodine at room temperature is correct?

- A. Chlorine is gas and iodine is solid.
- B. Chlorine is liquid and iodine is gas.
- C. Chlorine and iodine are gases.
- D. Chlorine is solid and iodine is liquid.

13. Halogens are strong _____

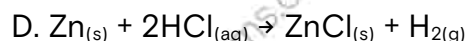
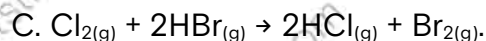
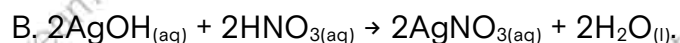
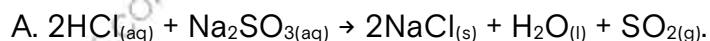
- A. acids.
- B. bases.
- C. electrons donors.
- D. oxidizing agents.



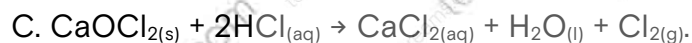
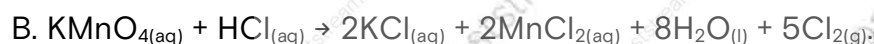
From the equation of reaction above, chlorine is acting as an _____

- A. oxidizing agent.
- B. dehydrating agent.
- C. reducing agent.
- D. drying agent.

15. Which of these options is a displacement chemical reaction?



16. Which of the following methods of preparing chlorine gas involves heat?



D. Electrolysis of brine.

17. Chlorine is added to a town's water supply to _____

A. clear its colour by oxidizing discolouring impurities.

B. kill bacteria since it is antiseptic.

C. form calcium chloride thereby improving its mineral content.

D. precipitate any silver or lead ions present since these ions are poisonous.

18. The process whereby hydrochloric acid is used to remove oxides from metals before electroplating is known as _____

A. sorting.

B. picking.

C. pickling.

D. none of the above.

19. The reaction between common salt and concentrated tetraoxosulphate (VI) acid liberates _____

A. sulphur (IV) oxide.

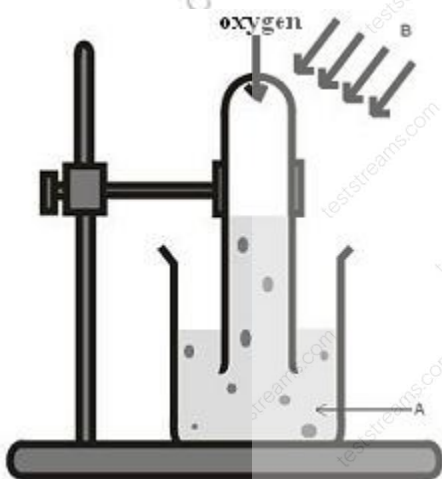
B. oxygen and chloride.

- C. hydrogen chloride gas.
- D. hydrogen sulphide gas.

20. Chlorine is not used in _____

- A. aerosol propellants.
- B. making polychloroethene.
- C. making chemicals (disinfectants).
- D. making photographic materials.

21. From the diagram drawn, what is the part labelled B?



- A. sunlight.
- B. chlorine water.
- C. phosphorus.
- D. hydrogen sulphide.

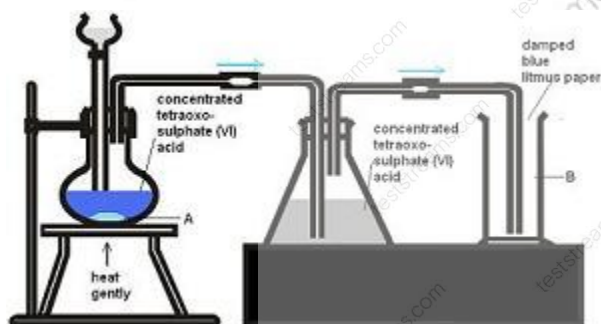
22. The bleaching action of chlorine in water is because _____

- A. of its reducing property.
- B. of its oxidizing power.
- C. it is a weak acid.
- D. it is an oxygen acceptor.

23. _____ is used in etching glass and in cleaning steel.

- A. Hydrofluoric acid
- B. Hydrochloric acid
- C. Hydrogen bromide
- D. Hydrogen iodide

24. The diagram drawn is an illustration of the experiment to _____

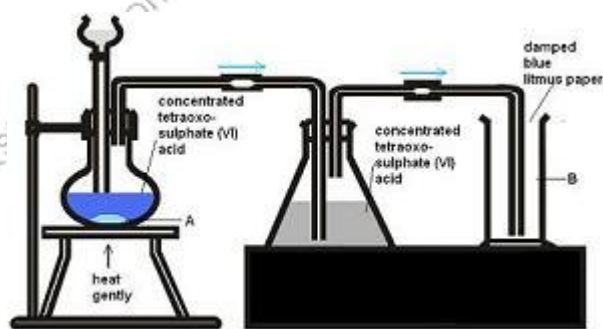


- A. prepare chlorine.
- B. prepare hydrogen bromide.
- C. prepare hydrogen chloride.
- D. study the effect of hydrogen chloride as a bleaching agent.

25. From the diagram drawn, what is the part labelled A?

- A. hydrogen sulphide.
- B. sunlight.
- C. chlorine water.
- D. phosphorus.

26. From the diagram drawn, the part labelled A is _____



- A. chlorine.
- B. sodium trioxonitrate (V).
- C. hydrogen chloride.
- D. sodium chloride.

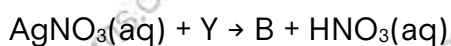
27. The product obtained when chlorine is bubbled through a freshly prepared solution of slaked lime is _____

- A. bleaching powder.
- B. chloride salt.
- C. hydrochloric acid.
- D. oxochlorate (I) acid.

28. Fluorine can be found in minerals like _____

- A. cryolite and bauxite.
- B. cryolite and fluorspar.
- C. fluorspar and apatite.
- D. phosphorite and bauxite.

29. What is Y in the reaction given below?



- A. H_2CO_3 .
- B. HNO_3 .

C. H_2SO_4 .

D. HCl .

30. Which of the following equations represents the reaction of chlorine with hot concentrated sodium hydroxide solution?

A. $2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{NaClO}$.

B. $4\text{NaOH} + 2\text{Cl}_2 \rightarrow 4\text{NaCl} + 2\text{H}_2\text{O} + \text{O}_2$.

C. $6\text{NaOH} + 3\text{Cl}_2 \rightarrow 5\text{NaCl} + \text{NaClO}_3 + \text{H}_2\text{O}$.

D. $2\text{NaOH} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{H}_2\text{O}_2$.

31. Which of the following are correct physical properties of hydrogen chloride?

(i) Pure hydrogen chloride is a colourless gas with a sharp, irritating smell.

(ii) It turns damp litmus paper red.

(iii) It is very soluble in water.

(iv) It forms misty fumes in moist air because it dissolves in the moisture forming hydrochloric acid.

A. (i), (ii) and (iii).

B. (ii), (iii) and (iv).

C. (i), (ii), (iii) and (iv).

D. (i) and (iv).

32. Which of the following reagents are used to test for hydrogen chloride?

(i) Ammonia.

(ii) Damp litmus paper

(iii) Silver trioxonitrate.

(iv) Starch-iodide paper

A. (i) and (iii).

B. (i), (ii) and (iii).

C. (ii) and (iv).

D. (i) and (ii).

33. Which of the following indicates the correct increasing order of oxidising power of the halogens?

A. $I < Br < Cl < F$.

B. $Br < I < Cl$

C. $Cl < F < I$

D. $F < Cl < Br < I$.

34. Which of the following is a physical property of chlorine?

(i) Chlorine is greenish-yellow gas with an unpleasant choking smell.

(ii) It is moderately soluble in water.

(iii) It is denser than air.

(iv) It is poisonous.

A. (i), (ii), (iii) and (iv).

B. (i) and (ii).

C. (i), (ii) and (iii).

D. (i), (ii) and (iv).

35. In the laboratory preparation of chlorine, the drying agent used is _____

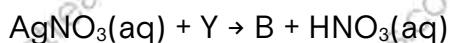
A. conc. H_2SO_4 .

B. conc. HCl .

C. silica gel.

D. $CaCl_2$.

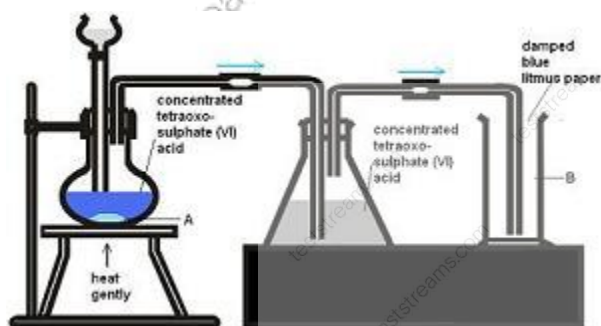
36. What is B in the reaction given below?



A. Ag_2CO_3 .

- B. Ag_2SO_4 .
- C. AgCl .
- D. AgNO_3 .

37. The part labelled B from the diagram drawn is _____



- A. dry hydrogen chloride.
- B. sodium trioxonitrate (V).
- C. sodium chloride.
- D. chlorine.

38. Which of the following chlorides is insoluble in water?

- A. AgCl .
- B. KCl .
- C. NH_4Cl .
- D. ZnCl_2 .

39. Chlorine reacts with metals to form chlorides except _____

- A. $\text{Cl}_2 + \text{Fe} \rightarrow \text{FeCl}_2$.
- B. $3\text{Cl}_2 + 2\text{Al} \rightarrow 2\text{AlCl}_3$.
- C. $2\text{Cl}_2 + \text{Sn} \rightarrow \text{SnCl}_4$.
- D. $\text{Cl}_2 + 2\text{Na} \rightarrow 2\text{NaCl}$.

40. Chlorine reacts with hydrogen to form hydrogen chloride. Under what condition does this reaction occur without explosion?

- A. Under bright sunlight.
- B. Under diffused sunlight.
- C. In the presence of nickel catalyst.
- D. Under strong heating.

41. Which of the following options is double decomposition used to prepare metallic chloride?

- (i) PbCl_2 .
 - (ii) AgCl .
 - (iii) CuCl_2 .
 - (iv) FeCl_3 .
- A. (i), (iii) and (iv).
 - B. (ii) and (iii).
 - C. (i) and (ii).
 - D. (iv) only.

42. Bromine was discovered by _____

- A. Balard.
- B. Scheele.
- C. Courtois.
- D. Cavendish.

43. What gas forms white fumes when hydrogen chloride is introduced?

- A. hydrogen sulphide.
- B. ammonia.
- C. dinitrogen (I) oxide.
- D. phosphorus (II) oxide.

44. From the equation given below;



give the condition of reaction.

- A. Cold dilute NaOH.
- B. Hot concentrated NaOH.
- C. Warm dilute NaOH.
- D. Hot dilute NaOH.

45. When chlorine water is exposed to sunlight, the products formed are _____

- A. hydrochloric acid and oxygen.
- B. chlorine gas and oxochlorate (I) acid.
- C. oxygen and oxochlorate (I) acid.
- D. hydrogen and oxygen.

46. One of these equations stands for the manufacture of hydrogen chloride.

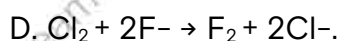
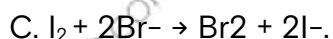
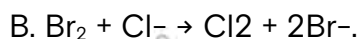
- A. $2\text{NaCl}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{HCl}(\text{g})$.
- B. $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$.
- C. $\text{NaCl}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{NaHSO}_4(\text{aq}) + \text{HCl}(\text{g})$.
- D. $\text{NaCl}(\text{s}) + \text{NaHSO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + \text{HCl}(\text{g})$.

47. Which metal is attacked by chlorine but not by dilute hydrochloric acid?

- A. Hg.
- B. Ca.
- C. Mg.
- D. Ag.

48. Which of these is correct?

- A. $\text{Cl}_2 + 2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{Cl}^-$.



49. Fluorine is prepared by _____

A. reaction of sodium fluoride and concentrated hydrogen trioxonitrate.

B. contact process.

C. electrolysis.

D. none of the above.

50. Which of the following are catalysts used in the preparation of chlorine?

(i) Manganese (IV) oxide.

(ii) Potassium tetraoxomanganate (VII).

(iii) Lead (IV) chloride.

A. (i) and (ii).

B. (iii) only.

C. (ii) only.

D. (i) only.

TOPIC: ELECTRODE POTENTIALS. ELECTROCHEMICAL SERIES. ELECTROLYSIS

DIRECTION: Choose the correct options from the lettered options.

1. An electrolyte conducts electricity only when _____

[i] molten.

[ii] in solution.

[iii] solid.

A. [i] only.

B. [ii] only.

C. [i] and [ii] only.

D. [i], [ii] and [iii] only.

2. The law that states, the mass of an element discharged during an electrolysis is directly proportional to the quantity of electricity [Q] passing through it is _____

A. Faraday's first law of electrolysis.

B. Faraday's second law of electrolysis.

C. Faraday's third law of electrolysis.

D. Faraday's zeroth law of electrolysis.

3. 0.05 Faraday of electricity is passed through acidulated water using platinum electrodes. What volume of each gas is evolved?

A. 0.56 dm³ of H₂ and 0.28 dm³ of O₂.

B. 1.12 dm³ of H₂ and 0.56 dm³ of O₂.

C. 0.224 dm³ of H₂ and 0.112 dm³ of O₂.

D. 2.24 dm³ of H₂ and 4.48 dm³ of O₂.

4. When the concentration of an electrolyte decreases, the conductivity _____

- A. decreases.
- B. increases.
- C. remains constant.
- D. tends to negative value.

5. Zinc easily displaces copper from copper [II] salt solution but lead will not displace copper from copper [II] salt.

Which options best explains the statement?

- A. Zinc is placed far below copper in the activity series.
- B. Lead is placed far above copper in the activity series.
- C. Zinc is placed far above copper in the activity series.
- D. Copper is placed far above zinc in the activity series.

6. In an electrochemical cell, reduction always occur _____

- A. at the cathode.
- B. at the anode.
- C. in the electrolyte.
- D. none of the above.

7. In electrolytic purification process, the impure metal to be purified is used as _____

- A. anode.
- B. cathode.
- C. electrolyte.
- D. salt bridge.

8. Potential difference set up when a metal is in contact with one molar solution of its ions at 25°C is called _____

- A. inert standard potential.
- B. standard electrode potential.
- C. electrochemical cell.
- D. galvanic cell.

9. Given the electron volt for bromine is +1.33 and iron is +0.77, the half-cell reaction is $\text{Fe(s)}|\text{Fe}^{2+}(\text{aq})||2\text{Br}^{-}(\text{aq})|\text{Br}_2(\text{g})$, what is the electrode potential of the system?

- A. +0.56V.
- B. -0.56V.
- C. +2.1V.
- D. -2.1V.

10. The flow of current in electrolytes is due to the movement of _____

- A. electrons.
- B. holes and electrons.
- C. ions.
- D. charges.

11. Which of the following statements about the cell notation $\text{Mg}|\text{Mg}^{2+}||\text{Cu}^{2+}|\text{Cu}$ is correct?

- A. Copper is the anode.
- B. Magnesium is reduced.
- C. Magnesium is the anode.
- D. The double line represents the electrodes.

12. Find the number of coulombs required to liberate 32g of copper.

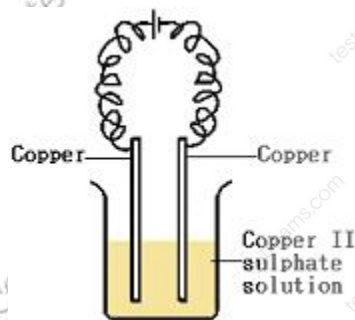
[Cu = 63.5, 1F = 96,500C]

- A. 48629.9 coulombs.
- B. 92759.8 coulombs.
- C. 46829.9 coulombs.
- D. 97259.8 coulombs.

13. _____ are conductors through which an electric current enters or leaves the electrolyte.

- A. Electrolytic cells
- B. Electrolytes
- C. Electrolysis
- D. Electrodes

14. Consider the cell drawn, the reaction occurring at the anode is _____



- A. $\text{SO}_4^{2-} \rightarrow \text{SO}_4 + 2\text{e}^-$.
- B. $\text{OH}^- \rightarrow \text{OH} + \text{e}^-$.
- C. $\text{Cu}_2^+ + 2\text{e}^- \rightarrow \text{Cu}$.
- D. Electrodes dissolves.

15. Which of the following reaction takes place at the anode of a lead accumulator during recharging?

- A. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{Pb}_{(\text{s})}$.
- B. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{Pb}_{(\text{s})}$.
- C. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{PbSO}_{4(\text{s})}$.
- D. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{PbO}_{2(\text{s})}$.

16. Electrolyte in the dry Leclanche' cell is _____

- A. anhydrous ZnSO_4 .
- B. pasty MnO_2 .
- C. NH_4Cl paste.
- D. muslin bag.

17. What is the mass of silver in grams deposited when a current of 2A is passed through a solution of silver salt for 10 minutes?

[Ag = 108, 1 Faraday = 96500C]

- A. 0.02.
- B. 0.75.
- C. 1.34.
- D. 2.68.

18. When a current of 4A is passed through a solution of gold salt for 2hrs 10mins, find the time taken for 6.0g of gold to be deposited.

[Au = 197, 1 Faraday = 96 500C]

- A. 73.48 seconds.
- B. 734.8 seconds.
- C. 1,469.5 seconds.
- D. 7.348 seconds.

19. The anodic reaction during corrosion of iron is _____

- A. $\text{Fe}_{(s)} \rightarrow \text{Fe}^{3+}_{(aq)} + 3e^-$
- B. $\text{Fe}_{(s)} \rightarrow \text{Fe}^{3+}_{(aq)} + 2e^-$
- C. $\frac{1}{2}\text{O}_{2(aq)} + \text{H}_2\text{O}_{(l)} + 2e^- \rightarrow 2\text{OH}^-_{(aq)}$.
- D. $2\text{O}_{2(aq)} + \frac{1}{2}\text{H}_2\text{O}_{(l)} + 2e^- \rightarrow 2\text{OH}^-_{(aq)}$.

20. The following is a list of symbols of some of the elements in order of an 'activity series':

K, Mg, Al, Zn, Fe, H, Cu, Ag.

Which of these elements will not displace hydrogen from a dilute acid?

- A. Cu.
- B. Fe, Ag.
- C. Fe.
- D. Cu, Ag.

21. The discharge of ions during electrolysis is dependent on the _____

- (i) position of the ion in the e.c.s.
- (ii) concentration of the ions.
- (iii) nature of the electrode.
- (iv) size of the ions.

- A. (i) and (ii) only.
- B. (i) and (iii) only.
- C. (i), (ii) and (iii) only.
- D. (i), (ii), (iii) and (iv).

22. These are factors affecting standard electrode potential except _____

- A. pressure.
- B. overall energy change.
- C. the concentration of ions in the solution.
- D. temperature.

23. Which of the following substances will evolve hydrogen when it reacts with dilute hydrochloric acid?

- A. Ag.

B. Ca^{2+} .

C. Cu.

D. Fe.

$$24. \text{Zn}^{2+}_{(\text{aq})} | \text{Zn}_{(\text{s})} \quad E^\circ = + 0.76\text{V}$$

$$\text{Ag}^{+}_{(\text{aq})} | \text{Ag}_{(\text{s})} \quad E^\circ = + 0.80\text{V}$$

From the information given above, what is the e.m.f. of the cell represented by the equation below?



A. -0.04.

B. +0.04.

C. +0.76.

D. +0.80.

25. Half-cell electrode of copper system is represented conventionally as _____

A. $\text{Cu}_{(\text{s})} | \text{Cu}^{2+}_{(\text{aq})}$.

B. $\text{Cu}^{2+}_{(\text{aq})} | \text{Cu}_{(\text{s})}$.

C. $\text{Cu}^{2+}_{(\text{aq})} || \text{Cu}_{(\text{s})}$.

D. $\text{Cu} || \text{Cu}^{2+}$.

26. The direction of the current flow from a simple electrochemical cell is dependent on _____

A. the concentration of electrolyte used.

B. the electrodes.

C. the relative positions of the electrodes on the electrochemical series.

D. all of the above.

27. If copper and zinc rods dipped into dilute sulphuric acid are connected externally by a metallic conductor _____

- A. electrons flow from zinc to copper as zinc atoms are reduced.
- B. electrons flow from zinc to copper as zinc atoms are oxidised.
- C. electrons flow from copper to zinc as copper atoms are reduced.
- D. electrons flow from copper to zinc as copper ions are oxidised.

28. Given that M is the mass of a substance deposited in an electrolytic process and Q the quantity of electricity consumed, then Faraday's law can be written as _____

- A. $M = Z/Q$.
- B. $M = Q/Z$.
- C. $M = Z/2Q$.
- D. $M = QZ$.

29. In the redox reaction of iron rust, the brown iron [iii] oxide is formed at the _____

- A. anode.
- B. anode and cathode.
- C. cathode.
- D. surface of the iron.

30. The characteristics of lead accumulator include the following except _____

- A. lead [IV] oxide.
- B. zinc [II] tetraoxosulphate.
- C. dilute tetraoxosulphate [VI] acid solution.
- D. metallic lead.

31. A current is passed through three electrolytic cells connected in series containing solutions of silver trioxonitrate [V], copper [II] tetraoxosulphate [vi] and brine respectively. If 12.7g of copper are deposited in the second electrolytic cell, calculate the volume of chlorine liberated in third cell at 17°C and 800mmHg pressure.

[Cl = 35.5, 1F = 96500C, G. M. V. of gases at s. t. p. = 22.4dm³]

- A. 4.52dm³.
- B. 4.48dm³.
- C. 9.04dm³.
- D. 44.8ddm³.

32. The electrode potential of a given system depends on the following except _____

- A. overall energy change.
- B. type of electrolyte used.
- C. concentration of ions in the solution.
- D. temperature.

33. Which of the following statements is not correct about the electrolysis of CuSO₄(aq) using copper cathode and platinum anode?

- A. Copper is deposited at the cathode.
- B. Oxygen is liberated at the anode.
- C. It is used for the purification of copper.
- D. The solution becomes acidic.

34. When the potential difference of a metal is in contact with one-molar solution of its ions at 25°C, measured against a reference standard, it is known as _____

- A. electrochemical series.
- B. standard electrode potential.
- C. electrode potential.
- D. standard reaction potential.

35. Lead accumulator is an example of a secondary cell therefore, it must be charged by passing _____

- A. direct current.
- B. stabilized current.
- C. alternating current.
- D. back current.

36. In electrolysis, the electrode by which the conventional current enters the electrolyte or by which electrons leave an electrolyte is called _____

- A. anode.
- B. cathode.
- C. anion.
- D. cation.

37. Which of the following reaction takes place at the anode of a lead accumulator when discharging?

- A. $\text{PbO}_{2(s)} + 4\text{H}^+_{(aq)} + 2\text{e}^- \rightarrow \text{Pb}^{2+}_{(aq)} + 2\text{H}_2\text{O}_{(l)}$.
- B. $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + 2\text{e}^-$.
- C. $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + \text{SO}^{2-}_{4(aq)} + 2\text{e}^- \rightarrow \text{PbSO}_{4(s)}$.
- D. $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + \text{SO}^{2-}_{4(aq)} + 2\text{e}^-$.

38. The quantity of electricity required to discharge 1 mole of univalent ion is _____

- A. 9,600 C.
- B. 48,250 C.
- C. 96,500 C.
- D. 193,000 C.

39. Which of the following substances is a good conductor of electricity?

- A. Molten sulphur.
- B. Aqueous sucrose solution.
- C. Molten chalk.
- D. Solid chalk.

40. An electric current is passed through a solution of copper [II] sulphate using platinum electrodes. The substance liberated at the anode is _____

- A. Copper.
- B. Sulphate.
- C. Oxygen.
- D. Hydrogen.

41. What quantity of electricity is consumed when 5 amperes was passed in 1hr 45 mins during electrolysis?

- A. 31.5 kilocoulombs.
- B. 3150 coulombs.
- C. 15.8 kilocoulombs.
- D. 1580 coulombs.

42. Corrosion in iron is called _____

- A. tarnishing.
- B. rusting.
- C. electrode corrosion.
- D. galvanization.

43. Which of the following options are types of conductors?

- A. metallic and metalloid.

- B. electrolyte and metalloid.
- C. metallic and non-electrolyte.
- D. metallic and electrolyte.

44. The major function of a salt bridge in cell is to _____

- A. smoothen the electron flow.
- B. provide electrolyte
- C. complete the electric circuit.
- D. provide adequate driving force.

45. The chemical decomposition of a compound brought about by a direct current passing through either a solution of the compound or the molten compound is called _____

- A. electrolyte.
- B. electrolysis.
- C. electrolytic cell.
- D. electrode.

46. Calculate the time required to deposit 1.6g of copper [II] tetraoxosulphate [vi] solution by passing a current of 0.50 ampere.

[take relative atomic mass of Cu = 63.5, S = 32, O = 16]

- A. 2431.5 seconds.
- B. 1216 seconds.
- C. 9726 seconds.
- D. 1936.1 seconds.

47. When a metal plate is placed in a solution containing its ions, some of the atoms from the metal plate will ionize and go into solution as positively charged ions which of the following option favours the reaction?

A. The electrode or metal plate becomes positively charged with respect to the solution/electrolyte.

B. The electrode or metal plate becomes neutral with respect to the solution/electrolyte.

C. The electrode or metal plate has more protons with respect to the solution/electrolyte.

D. The electrode or metal plate becomes negatively charged with respect to the solution/electrolyte.

48. Corrosion in metals is an example of _____

A. electrochemical process.

B. half-cell reaction.

C. metal plating device.

D. metal coupling device.

49. In the preferential discharge of ions in electrolysis, a metal lower down in the activity series is discharged in preference to the one _____

A. below the metal.

B. above the metal.

C. below hydrogen.

D. above hydrogen.

50. When a metal plate is placed in a solution containing its ions, some of the metallic ions in solution will take up electrons from the metal plate and deposit themselves as neutral atoms on the plate, which option favours the reaction?

A. The electrode or metal plate becomes positively charged with respect to the solution/electrolyte.

B. The electrode or metal plate becomes neutral with respect to the solution/electrolyte.

C. The electrode or metal plate has more electrons with respect to the solution/electrolyte.

D. The electrode or metal plate becomes negatively charged with respect to the solution/electrolyte.

51. Which of the following statements is the best definition of an anode?

A. It is the negatively charged electrode.

B. It is the electrode at which electrons enter the electrolyte

C. It is the positively charged electrode.

D. It is the electrode at which hydrogen is evolved.

52. What quantity of electricity is consumed when 15 amperes was consumed in 11/4hrs during electrolysis?

A. 67.5 coulomb.

B. 675 coulomb.

C. 67.5 kilocoulomb.

D. 6750 coulomb.

53. The quantity of electricity is mathematically expressed as _____

A. $Q = mIt$.

B. $Q = Eit$.

C. $Q = mVt$.

D. $Q = It$.

54. Electromotive force of an electrochemical cell is given by _____

A. algebraic product between the electrode potentials of the electrodes.

B. algebraic difference between the electrode potentials of the electrodes.

C. algebraic sum between the electrode potentials of the electrodes.

D. algebraic zero between the electrode potentials of the electrodes.

55. Find the volume of oxygen liberated by 9650 coulombs of electricity.

[O = 16, 1F = 96,500C, G. M. V. of gas at s. t. p. = 22.4dm³]

- A. 17.92dm³.
- B. 1.12dm³.
- C. 0.56dm³.
- D. 2.24dm³.

56. Which of the following is the correct ionic equation for the reaction between magnesium and dilute hydrochloric acid?

- A. $\text{Mg}_{(s)} + 2e \rightarrow \text{Mg}^{(2+)}_{(aq)} \parallel 2\text{H}^{+}_{(aq)} \rightarrow \text{H}_{2(g)} + 2e$
- B. $\text{Mg}_{(s)} \rightarrow \text{Mg}^{(2+)}_{(aq)} + 2e \parallel 2\text{H}^{+}_{(aq)} + 2e \rightarrow \text{H}_{2(g)}$
- C. $\text{Mg}_{(s)} \rightarrow \text{Mg}^{(2+)}_{(s)} + 2e \parallel 2\text{H}^{+}_{(l)} \rightarrow \text{H}_{2(g)} + 2e$
- D. $\text{Mg}^{(2+)}_{(s)} \rightarrow \text{Mg}_{(s)} + 2e \parallel 2\text{H}^{+}_{(aq)} \rightarrow \text{H}_{2(g)}$

57. Calculate the mass of aluminium deposited when a current of 5.0 amperes is passed through an aluminium electrolyte for 1hr 30 mins.

[Al = 27, 1 Faraday = 96 500 coulomb]

- A. 2.52g.
- B. 7.55g.
- C. 3.78g.
- D. 0.042g.

58. Electrode potential value of pure hydrogen at all temperatures is _____

- A. 1.
- B. zero.
- C. 2.
- D. 0.5.

59. Which of the following equimolar solutions would have the highest conductivity?

- A. $\text{NH}_4\text{NO}_3(\text{aq})$.
- B. $\text{NaNO}_3(\text{aq})$.
- C. $\text{Mg}(\text{NO}_3)_2(\text{aq})$.
- D. $\text{Al}(\text{NO}_3)_3(\text{aq})$.

60. The overall redox reactions occurring at the electrodes is represented as (in copper | zinc cell) $\text{Cu}^{2+}(\text{aq})|\text{Cu}(\text{s})||\text{Zn}(\text{s})|\text{Zn}^{2+}(\text{aq})$, the double represents _____

- A. capacitor.
- B. battery.
- C. salt bridge.
- D. inert conductor.

61. In the activity series of metals, metals higher up will serve as _____

- A. cathode.
- B. anode.
- C. salt bridge.
- D. none of the above.

62. In the following electrolytic experiment copper electrode was used as the anode and platinum as the cathode, what happens when an electric current is passed through copper [II] tetraoxosulphate [VI] solution?

- A. Hydrogen gas is liberated at the cathode while sulphur[iv] oxide gas is liberated at the anode.
- B. Copper is deposited at the cathode while oxygen gas is liberated at the anode.
- C. Copper is deposited at the cathode while water is formed at the anode.
- D. Hydrogen gas is liberated at the cathode while oxygen gas is liberated at the anode.

63. The quantity of products liberated at the electrode during an electrolysis is dependent on _____

[i] magnitude of the steady current passed.

[ii] time of flow of the steady current.

[iii] ionic charge of the liberated element.

A. [i], [ii], [iii].

B. [ii] only.

C. [ii] and [iii].

D. [i] and [iii].

64. _____ is the chemical decomposition of a compound by which direct current passes through the solution of the compound or the molten compound.

A. Galvanization

B. Electrode potential

C. Electrolysis

D. Electrochemical cells

65. In which of the electrodes does oxidation occur?

A. At the cathode.

B. At the anode.

C. At the electrolyte.

D. At the half electrode.

66. One faraday is equal to _____

A. 9650 coulombs.

B. 96 500 coulombs.

C. one mole of electrons.

D. two a mole of electrons.

67. In the electrolysis of brine, the anode is _____

- A. aluminium.
- B. carbon.
- C. copper.
- D. platinum.

68. A current is passed through three electrolytic cells connected in series containing solutions of silver trioxonitrate [V], copper [II] tetraoxosulphate [VI] and brine respectively. If 12.7g of copper are deposited in the second electrolytic cell, calculate the mass of silver deposited in the first cell.

[AG = 108, Cu = 63.5, 1F = 96 500]

- A. 42.3g.
- B. 21.6g.
- C. 43.2g.
- D. 86.4g.

69. _____ is used to remove hydrogen gas from an electrochemical cell.

- A. Ammonium chloride
- B. Magnesium oxide
- C. Manganese [IV] oxide
- D. Zinc [II] tetraoxosulphate

70. An electric current was passed through an unknown solution. The gases which were evolved were collected and tested. The gas from the anode bleached damp litmus paper and the gas from the cathode burned with a squeaky pop. The solution was probably that of _____

- A. copper [II] sulphate.
- B. hydrochloric acid.
- C. nitric acid.
- D. tetraoxosulphate [VI] acid.

71. The electrode potential is positive when _____

- A. electrons flow from the hydrogen electrode to the metal electrode.
- B. electrons flow from both hydrogen electrode and metal electrode are equal.
- C. electrons do not flow from the hydrogen electrode to the metal electrode.
- D. electrons flow from the metal electrode to the hydrogen electrode.

72. What are the products of the electrolysis of concentrated calcium chloride solution?

- A. Ca, Cl₂.
- B. Ca, O₂.
- C. H₂, Cl₂.
- D. Ca, H₂, Cl₂.

73. What happens when an electric current is passed through copper [II] chloride solution using carbon electrodes?

- A. Hydrogen gas is liberated at the cathode while chlorine gas is liberated at the anode.
- B. Copper is deposited at the cathode while oxygen gas is liberated at the anode.
- C. Hydrogen gas is liberated at the cathode while water is formed at the anode.
- D. Hydrogen gas is liberated at the cathode while oxygen gas is liberated at the anode.

74. In an electrochemical cell, the exchange of ions between the cells occur through the _____

- A. copper wire.
- B. electrodes.
- C. electrons.
- D. salt bridge.

75. The following is a list of symbols of some of the elements in order of an activity series:

K, Mg, Al, Zn, Fe, H, Cu, Ag.

Which of these elements reacts with cold water?

- A. K.
- B. Al.
- C. Mg.
- D. Zn.

76. During discharging process of a lead accumulator _____

- A. the density of the acid and e.m.f. increases.
- B. the density of the acid and e.m.f. are the same.
- C. the density of the acid and e.m.f. is zero.
- D. the density of the acid and e.m.f. decreases.

77. 0.25 amperes flowing for 40 mins deposits 0.198g of a certain metal at the cathode. The weight of the metal deposited by 1 coulomb is _____

- A. 0.00011 g.
- B. 0.00033 g.
- C. 0.00066 g.
- D. 0.00044 g.

78. In the electrolysis of a solution of copper [ii] tetraoxosulphate [vi] using copper electrodes, these results were obtained:

Mass of copper anode before experiment = 14.40g.

Mass of copper anode after experiment = 8.00g.

Mass of copper cathode before experiment = 11.50g.

Mass of copper cathode after experiment = 18.10g.

Given that one faraday is 96,500C and that the current used to carry out the electrolysis was 2 kilo-ampere,

find how long it took to carry out the electrolysis.

[Cu = 63.5]

- A. 100.3 seconds.
- B. 10.03 seconds.
- C. 97.3 seconds.
- D. 9.73 seconds.

79. The characteristics of a leclanché cell include the following except _____

- A. zinc and carbon electrode.
- B. ammonium chloride solution.
- C. zinc [II] tetraoxosulphate.
- D. manganese [IV] oxide.

80. The following conditions govern the discharge of ions except _____

- A. position of the ions in the activity series.
- B. concentration of ions in the electrolyte.
- C. temperature of the electrolyte.
- D. nature of electrode.

81. The Daniel cell is a simple voltaic cell which produces an e.m.f of about _____.

- A. 12 volts.
- B. 6.4 volts.
- C. 2.12 volts.
- D. 1.15 volts.

82. Two half cells which are capable of converting chemical energy to electrical energy is called _____

- A. a cell.
- B. electrochemical cell.
- C. chemical potential.
- D. metallic potential.

83. Calculate the amount of gold deposited when a current of 4A is passed through a solution of gold salt for 2 hrs 10 mins.

[Au = 197, 1 Faraday = 96 500C]

- A. 6.37g.
- B. 1.06g.
- C. 31.8g
- D. 63.7g.

84. In the electrolysis of brine, the anode must be carbon because _____

- A. chlorine does not reduce carbon.
- B. carbon is a reducing agent.
- C. carbon induces the discharge of chlorine.
- D. chlorine attacks other elements but not carbon.

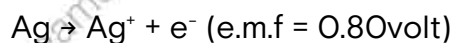
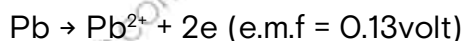
85. The following is a list of symbols of some of the elements in order of an activity series:

K, Mg, Al, Zn, Fe, H, Cu, Ag.

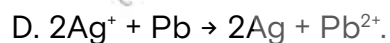
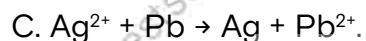
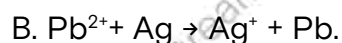
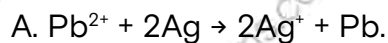
Which of these elements does not react with water?

- A. Fe, Cu.
- B. Ag, Zn.
- C. Cu, Ag.
- D. Ag, Fe.

86. The half-cell reaction with their appropriate oxidation potentials are



Which of the following reactions takes place?



TOPIC: HYDROGEN AND OXYGEN COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

- An isotope of hydrogen commonly referred to as heavy water is _____
 - protium.
 - tritium.
 - deuterium.
 - basic water.
- Hydrogen is manufactured via the following methods except _____
 - action of steam on iron.
 - action of steam on red-hot coke.
 - action of steam on methane under nickel catalyst.
 - electrolytic method.
- Most acid anhydrides react with water to form acids. Which of these is a mixed anhydride?
 - N_2O .
 - NO.
 - NO_2 .
 - SO_2 .
- The following are physical properties of hydrogen except _____
 - it is a colourless, odourless and tasteless gas.
 - it is neutral to moist litmus paper.
 - it is slightly soluble in water.
 - it is less dense than air.

5. All, except one metal can displace hydrogen from water or acids.

- A. Zinc.
- B. Silver.
- C. Potassium.
- D. Heated magnesium.

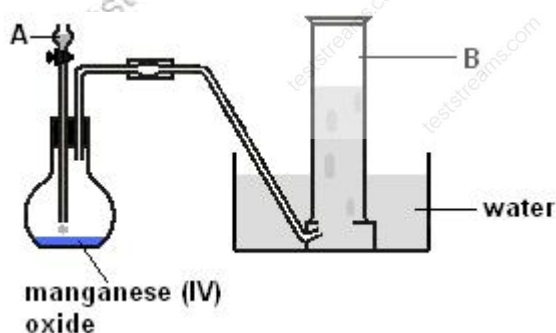
6. The oxidation state of hydrogen in the hydride of nitrogen is _____

- A. +1.
- B. +3.
- C. -3.
- D. -1.

7. The following are distinct property that differentiates oxygen from dinitrogen (I) oxide except _____

- A. smell.
- B. solubility in water.
- C. reaction with nitrogen (IV) oxide.
- D. reaction with heated copper.

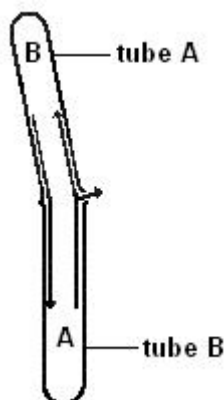
8. The diagram drawn is an illustration of the experiment for the _____



- A. preparation of oxygen from potassium trioxochlorate (V).
- B. preparation of oxygen from potassium heptaoxochromate (VI).

- C. study the reducing action of oxygen,
- D. preparation of oxygen from hydrogen peroxide solution.

9. From the diagram drawn the part labelled B is _____

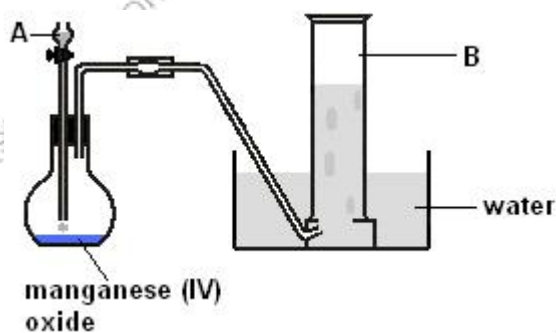


- A. air.
- B. chlorine.
- C. hydrogen.
- D. oxygen.

10. The chemical behaviour of hydrogen can be explained by the following except _____

- A. it accepts an electron from another atom to form the negative hydride ion, H^- .
- B. it donates its electron to form positive hydrogen ion, H^+ , and enters into electrovalent bond formation.
- C. it forms a covalent bond by sharing its lone electron as in the hydrogen molecule, $H-H$.
- D. it donates its lone electron to form the positive hydrogen ion, H^+ , and enters into coordinate bond formation with molecules having lone pairs of electrons.

11. From the diagram drawn, the part labelled A is _____



- A. potassium trioxochlorate (V).
- B. potassium heptaoxochromate (VI).
- C. hydrogen peroxide.
- D. hydrochloric acid.

12. Which of these is not an amphoteric oxide?

- A. ZnO.
- B. Al_2O_3 .
- C. SnO_2 .
- D. Na_2O_2 .

13. Which of these gases has the following chemical characteristics?

- (i) Combine with other elements except rare gases
- (ii) Combines with some halogens
- (iii) Forms multiple bonds with itself

- A. CO.
- B. N_2 .
- C. O_2 .
- D. H_2 .

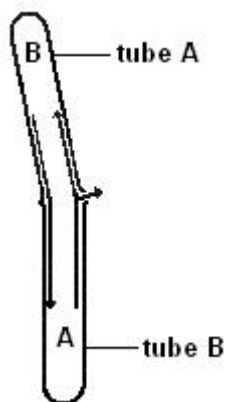
14. Which of these reactions with oxygen is slowest?

- A. Rusting.
- B. $\text{Fe} + \text{O}_2$.
- C. Petrol + O_2 .
- D. Coal + O_2 .

15. The following are methods of laboratory preparation of hydrogen except _____

- A. action of zinc on an acid.
- B. action of non-metals on an acid.
- C. action of sodium on cold water.
- D. action of iron on steam.

16. The diagram drawn is an illustration _____



- A. to study the reaction of hydrogen with other metals.
- B. to test for hydrogen.
- C. to demonstrate that hydrogen is lighter than air.
- D. to show the reducing action of hydrogen.

17. Oxygen is prepared in the laboratory by the following methods with the exception of _____

- A. decomposition of potassium trioxochlorate (V).

- B. oxidation of hydrogen peroxide.
- C. decomposition of potassium heptaoxochromate (VI).
- D. decomposition of hydrogen peroxide.

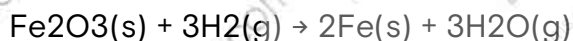
18. Which of the following metals will not give hydrogen when combined with dilute hydrochloric acid?

- A. Cu.
- B. Fe.
- C. Mg.
- D. Zn.

19. When a non-metal combines with oxygen, _____ is formed.

- A. basic oxide
- B. amphoteric oxide
- C. neutral oxide
- D. acidic oxid

20. From the reaction given below;



hydrogen is behaving as a _____

- A. oxidizing agent.
- B. reducing agent.
- C. steam donor.
- D. hydride.

21. These are various methods of preparing oxygen except _____

- A. $\text{KI}(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$
- B. $\text{KMnO}_4(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) \rightarrow$

C. $\text{H}_2\text{O}_2(\text{aq}) \rightarrow$

D. $\text{MnO}_2(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) \rightarrow$

22. Plants are green because they contain _____

A. chlorophyll.

B. hemoglobin.

C. glucose.

D. vitamin C.

23. Which of the following options is the correct order by which metals displace hydrogen when reacting with acid?

A. $\text{Na} > \text{Ca} > \text{Mg} > \text{Zn}$.

B. $\text{Na} < \text{Ca} < \text{Mg} < \text{Zn}$.

C. $\text{Na} < \text{Ca} > \text{Mg} < \text{Zn}$.

D. $\text{Na} > \text{Ca} < \text{Mg} > \text{Zn}$.

24. The following except _____ are examples of neutral oxides.

A. nitrogen (II) oxide.

B. carbon (II) oxide.

C. water.

D. nitrogen (I) oxide.

25. Hydrogen is manufactured by _____

A. Bosch process.

B. Solvay process

C. Frasch process.

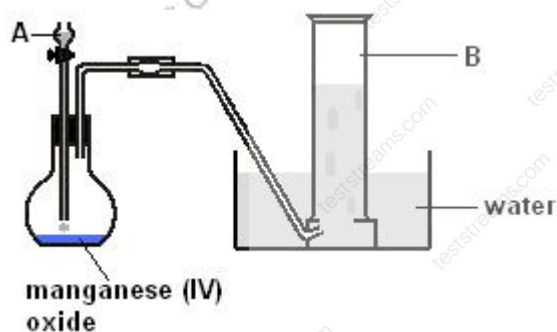
D. Contact process.

26. What is the name of the gas with the following characteristics?

- (i) A good bleaching agent
- (ii) Used in ventilating stuffy chambers.
- (iii) Used as a disinfectant in water and sewage.

- A. CO.
- B. Cl₂.
- C. O₃.
- D. N₂O

27. From the diagram drawn, the part labelled B is _____



- A. oxygen.
- B. hydrogen.
- C. ozone.
- D. nitrogen.

28. Which of these gases has the following physical properties?

- (i) Diatomic gas.
- (ii) Colourless, tasteless and odourless.
- (iii) Slightly soluble in water.
- (iv) Liquefies easily.

- A. CO.
- B. N₂.

C. O₂

D. H₂

29. When a lighted splinter is introduced into a test tube containing an unknown gas a _____ sound is heard showing that the gas is _____

A. pop, oxygen.

B. pop, hydrogen.

C. pop, hydrogen sulphide.

D. pop, hydrogen chloride.

30. Oxygen was officially discovered by _____

A. Carl Wilhelm Scheele.

B. Joseph Priestley.

C. Antoine Lavoisier.

D. Henry Cavendish.

31. Which of these oxides occur in snow, dew, air and water when exposed to brilliant sunlight?

A. K₂O.

B. H₂O₂.

C. Pb₃O₄.

D. Fe₃O₄.

32. Sodium hydride reacts with water to _____

A. form an acidic solution.

B. liberate hydrogen gas.

C. form a salt.

D. liberate oxygen.

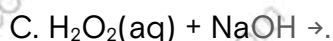
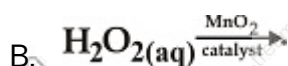
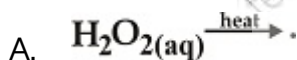
33. The oxides formed when elements combine with oxygen are classified into the following groups except _____

- A. basic oxides.
- B. neutral oxides.
- C. peroxides.
- D. acidic oxides.

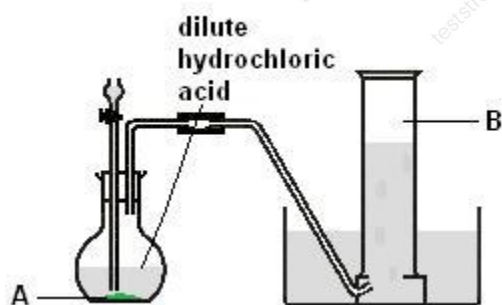
34. The most abundant element on earth is _____

- A. nitrogen.
- B. helium.
- C. silicon.
- D. oxygen.

35. The decomposition of hydrogen peroxide is accelerated by these treatments except _____



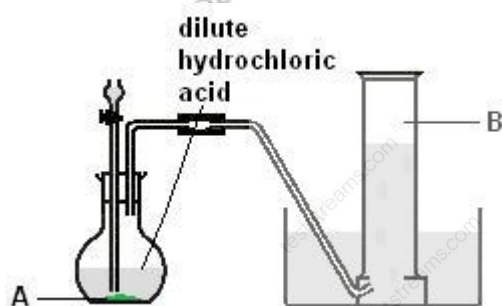
36. The diagram drawn is an illustration of the experiment for the _____



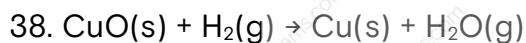
A. preparation of oxygen by the action of dilute acid on lead.

- B. preparation of hydrogen by the action of dilute acid on copper.
- C. preparation of chlorine by the action of dilute acid on iron.
- D. preparation of hydrogen by the action of dilute acid on zinc.

37. From the diagram drawn, the part labelled B is _____



- A. chlorine.
- B. hydrogen.
- C. oxygen.
- D. carbon (IV) oxide.



from the reaction given above, hydrogen is acting as a _____

- A. reducing agent.
- B. oxidizing agent.
- C. dehydrating agent.
- D. drying agent.

39. The following are elements that form amphoteric oxides when combined with oxygen except _____

- A. copper.
- B. aluminium.
- C. tin.
- D. lead.

TOPIC: METALS AND ITS COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. Which of the following statements is not true of tin?

- A. It is a p-block element
- B. It is extracted from cassiterite, SnO_2
- C. It is used for protecting iron containers from corrosion
- D. It combines with copper to form the alloy brass

2. Which of the following additions could improve the quality of steel?

- A. Silicon.
- B. Sulphur and phosphorus.
- C. Carbon.
- D. Chromium and nickel.

3. Sodium chloride has a solubility product value because of it's _____

- A. saline nature.
- B. high solubility.
- C. low solubility.
- D. insolubility.

4. The products of combustion of magnesium in air are _____

- A. magnesium oxide only.
- B. magnesium oxide + magnesium hydroxide.
- C. magnesium oxide + magnesium dioxide.
- D. magnesium oxide + magnesium nitride.

5. Which of the following metals can be found in a pure state in nature?

- A. Lithium
- B. Iron
- C. Gold
- D. Aluminium

6. Which of the following metals will give the most vigorous reaction with water?

- A. Aluminum.
- B. Calcium.
- C. Magnesium.
- D. Sodium.

7. Which of the following metals exists as liquid at ordinary temperature?

- A. Copper.
- B. Gold.
- C. Mercury.
- D. Silver.

8. The green colour solution of an iron (II) salt changes to a brown colour solution of iron (III) salt by a process known as _____

- A. conversion.
- B. elimination.
- C. oxidation.
- D. reduction.

9. Alloys are mixtures of pure metals, which statement tends to be true of alloys?

- A. The melting point of an alloy is usually lower than the melting points of the pure metals.

B. The melting point of an alloy tends to be higher than the melting points of its component metals.

C. There is no general trend regarding melting points of alloys compared to melting points of the pure metal component.

D. A and B.

10. Most metals have _____

A. high electronegativities.

B. low electronegativities.

C. small atomic radii.

D. high ionization energies.

11. Which of the following elements readily forms ions with charges of +2 and +3?

A. Aluminium.

B. Copper.

C. Iron.

D. Lead.

12. Metals which burn on exposure to air are best stored under _____

A. water.

B. alcohol.

C. vinegar.

D. kerosene.

13. Which of the following metals will produce hydrogen on reacting with dilute hydrochloric acid?

(I) Zn.

(II) Mg.

(III) Fe.

(IV) Al.

A. I & II.

B. III & IV.

C. I, II & III.

D. I, II, III & IV.

14. Which of the following statements are correct of the compound with the formula $K_4Fe(CN)_6$?

(I) It's IUPAC name is potassium hexacyanoferrate (II).

(II) It has six ligands.

(III) It is a complex salt of a transition metal.

(IV) It is used to test for iron (iii) ions.

A. I & II.

B. III & IV.

C. I, II & III.

D. I, II, III & IV.

15. Which of these metals is present in brass, bronze and duralumin?

A. Al.

B. Cu.

C. Mg.

D. Sn.

16. Stages in the extraction of tin from tinstone include _____

(I) washing with water.

(II) crushing the ore.

(III) smelting the ore.

(IV) electrolytic purification.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

17. Which of the following is a waste product in the Solvay process for the manufacture of sodium trioxocarbonate (IV)?

- A. Ammonium chloride
- B. Calcium chloride
- C. Limestone
- D. Calcium oxide

18. The ability of a metal to be drawn into wire is a measure of its _____.

- A. ductility
- B. hardness
- C. malleability
- D. strength

19. Potassium and sodium show similar chemical properties because they _____

- A. belong to the same group in the periodic table.
- B. have equal number of electrons in their outermost shells.
- C. both exist in the +1 oxidation state in their compounds..
- D. A, B, and C

20. Which of these metals constitutes the alloy of bronze in its simplest form?

- A. Copper and tin.
- B. Copper and zinc.
- C. Copper, zinc, and nickel.
- D. Copper, tin, and lead.

21. Copper can best be purified by _____

- A. roasting the impure copper in blast furnace.
- B. heating the oxide with coke.
- C. electrolyzing a copper (ii) salt solution using the impure copper as the anode.
- D. converting the impure copper to a trioxonitrate (v).

22. Which of the following compounds is used for removing impurities from bauxite?

- A. NaOH.
- B. CaCO_3 .
- C. H_2SO_4 .
- D. Na_3AlF_6 .

23. The functions of limestone in the extraction of iron in the blast furnace is _____

- A. removal of the earthy impurities.
- B. decomposition of the iron ore.
- C. conversion of iron (III) to iron (II).
- D. generation of heat for the processor.

24. Aqueous solution of hydroxide can be used to test for the presence of _____.

- (I) Ca^{2+}
 - (II) Zn^{2+}
 - (III) NH_2^+
 - (IV) Cu^{2+}
- A. I & II.
 - B. III & IV.
 - C. I, II & III.
 - D. I, II, III & IV.

25. Which of the following statements is a property of transition metals?

- A. They are hard and have high melting metals.
- B. Their densities increases moving from left to right across the periodic table.
- C. They have low ionization energies.
- D. All of the above.

26. Which of the following are physical properties?

- I. Combustibility.
- II. Heat conductivity.
- III. Length.
- IV. Brittleness.

- A. ii, iii & iv.
- B. ii & iv.
- C. i, ii & iv.
- D. all of the above.

27. Which of the following is not a naturally occurring iron ore?

- A. FeCl_2
- B. Fe_2O_3
- C. Fe_3O_4
- D. FeCO_3

28. The manufacture of plaster of paris is represented by the equation _____

- A. $\text{Ca(OH)}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{H}_2\text{O}$
- B. $\text{Ca(OH)}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.
- C. $\text{CaO} + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O}$.
- D. $2(\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}) \rightarrow (\text{CaSO}_4)_2 \cdot \text{H}_2\text{O} + \text{H}_2\text{O}$.

29. Which of the following reactions will give a green gelatinous precipitate?

- A. $\text{Al}^{3+}(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{s}) + 3\text{Na}^+(\text{aq})$.
- B. $\text{Cu}^{2+}(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s}) + 2\text{Na}^+(\text{aq})$.
- C. $\text{Fe}^{2+}(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_2(\text{s}) + 2\text{Na}^+(\text{aq})$.
- D. $\text{Fe}^{3+}(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_3(\text{s}) + 3\text{Na}^+(\text{aq})$.

30. Galvanized metals are covered with a thin sheet of _____

- A. chromium.
- B. copper.
- C. tin.
- D. zinc.

31. The substances used for making mortar include _____

- A. calcium oxide.
- B. water.
- C. sand.
- D. calcium trioxocarbonate (vi).

32. The main characteristic feature of transition metals is that they _____.

- A. have the same atomic size
- B. are reducing agents
- C. form ions easily
- D. have variable oxidation states

33. The properties of aluminium which make the metal useful in the manufacture of cooking utensils include it's:

- (I) resistance to corrosion
- (II) lightness and durability

(III) ability to conduct heat and electricity

(IV) ability to react

A. I & II

B. III & IV

C. I, II & III

D. I, II, III & IV

34. Metals of the first transition series have special properties which are different from those of groups I and II elements because they have partially filled _____.

A. d orbitals

B. s orbitals

C. f orbitals

D. p orbitals

35. Sodium _____

(a) is an alkaline earth metal.

(b) forms ions with a +2 charge.

(c) can combine with iodine to form Na_2I .

(d) is a non-metal.

A. a, b & c.

B. d only.

C. b & d.

D. none of the above.

36. The best way to distinguish between Na_2CO_3 and NaHCO_3 is by _____

A. heating.

B. adding acid.

C. adding alkali.

D. crystallization.

37. The major component of the slag from the production of iron is _____.

- A. an alloy of calcium and iron
- B. coke
- C. impure tin
- D. calcium trioxosilicate (IV)

38. The main function of limestone in the blast furnace is to _____

- A. act as a reducing agent.
- B. act as a catalyst.
- C. remove impurities.
- D. supply carbon (IV) oxide.

39. Copper (II) tetraoxosulphate (VI) is widely used as _____

- A. fertilizer
- B. fungicide
- C. disinfectant
- D. purifier

40. Which of these is not a property of metals?

- A. They conduct heat and electricity.
- B. They are ductile.
- C. They have variable oxidation states.
- D. They have high melting and boiling points.

41. Rust is formed from iron and _____.

- A. hydrogen
- B. nitrogen

- C. oxygen
- D. sulphur

42. Bauxite is the ore of _____

- A. aluminium.
- B. zinc.
- C. lead.
- D. magnesium.

43. A suitable material for a match head can be made from a mixture of carbon, sulphur and potassium chlorate. Which best explains the role of the potassium chlorate?

- A. Acts as a catalyst to trigger the reaction.
- B. Absorbs poisonous gases formed in the combustion reaction.
- C. Burns exothermically with oxygen from the air.
- D. Produces oxygen to burn the sulphur.

44. Aluminium is above iron in the electrochemical series, yet iron corrodes easily on exposure to air while aluminium does not. This is because aluminium _____

- A. has a lower density than iron.
- B. is a better conductor than iron.
- C. does not corrode spontaneously.
- D. forms a thin layer of inert oxide in moist air.

45. The following metals are extracted by electrolytic method except _____

- A. potassium.
- B. calcium.
- C. sodium.
- D. tin.

46. Alloys are used in preference to pure metals because _____

- A. metals are too hard.
- B. metals are ductile.
- C. metallic properties are improved in alloys.
- D. alloys are a mixture of metals.

47. Metals conduct electricity because they have free _____.

- A. molecules
- B. electrons
- C. atoms
- D. ions

TOPIC: NITROGEN AND ITS COMPOUNDS***DIRECTION: Choose the correct options from the lettered options.***

1. Which ammonium salt is used to prevent dizziness and fainting?

- A. ammonium chloride.
- B. ammonium tetraoxosulphate (VI).
- C. ammonium trioxocarbonate (IV).
- D. ammonium trioxonitrate (V).

3. Ammonia reacts with excess chlorine to produce _____

- A. a chloride and free nitrogen.
- B. ammonia chloride.
- C. double chloride.
- D. a chloride and nitrogen (II) oxide.

4. Oxidation of nitrogen in Mg_3N_2 is _____

- A. -3.
- B. +3.
- C. -2.
- D. +2.

5. Which of the following does not play a direct role in the nitrogen cycle?

- A. Electrical discharge in the atmosphere.
- B. Decay of plants and animals.
- C. Erosion.
- D. Bacteria.

6. During the laboratory preparation of nitrogen, carbon (IV) oxide and oxygen are removed by passing air through _____

- A. soda ash solution.
- B. caustic soda solution.
- C. potassium tetraoxomanganate (VII).
- D. slaked lime.

7. Pure NO in an open gas jar is brown. This colour is easily removed by _____

- A. blowing excess air into the gas jar.
- B. bubbling the gas into caustic alkali.
- C. bubbling the gas into water.
- D. bubbling the gas into oxygen.

8. Which of the following options is not a physical property of nitrogen (II) oxide?

- A. It is soluble in water.
- B. It is a colourless, poisonous gas with an unknown smell.
- C. It is slightly denser than air.
- D. It is neutral to litmus.

9. Aqueous ammonia _____ the insoluble hydroxides of metals from solutions of their salts.

- A. precipitates
- B. reduces
- C. oxidizes
- D. dries

10. Ammonia reduces copper (II) oxide to _____

- A. copper, water and dinitrogen (I) oxide.

- B. copper (I) oxide, water and nitrogen.
- C. copper, water and nitrogen (II) oxide.
- D. copper, water and nitrogen.

11. Common laboratory drying agents are not used for drying ammonia because _____

- A. ammonia is alkaline.
- B. ammonia forms complexes with them.
- C. ammonia reacts with them and disappears into products.
- D. ammonia is highly soluble in water.

12. The following ammonium salts decompose when heated mildly except _____

- A. $(\text{NH}_4)_2\text{SO}_4$.
- B. NH_4NO_2 .
- C. $(\text{NH}_4)_2\text{CO}_3$.
- D. NH_4Cl .

13. The hydride of nitrogen which is capable of turning red litmus blue makes nitrogen to have an oxidation state of _____

- A. +2.
- B. -2.
- C. +3.
- D. -3.

14. When a copper turning reacts with trioxonitrate (V) acid _____ is produced.

- A. nitrogen (IV) oxide
- B. nitrogen (II) oxide
- C. dinitrogen (I) oxide
- D. none of the above

15. The product produced when tetraoxosulphate (VI) acid reacts with ammonia is _____

- A. ammonium chloride.
- B. ammonium trioxonitrate (V).
- C. ammonium tetraoxosulphate (VI).
- D. ammonium trioxocarbonate (IV).

16. To test for dinitrogen (I) oxide _____

- A. a reagent is introduced.
- B. a damp litmus paper is used.
- C. a brightly glowing splinter is introduced.
- D. none of the above.

17. Trioxonitrate (V) acid is manufactured industrially by the _____

- A. reaction of nitrogen (IV) oxide with water.
- B. catalytic reduction of ammonium salts.
- C. oxidation of ammonia with air.
- D. catalytic oxidation of ammonia with excess air.

18. Which of the following are physical properties of dinitrogen (I) oxide?

- (i) It is a colourless gas with a faint, pleasant but sickly smell and a sweetish taste.
- (ii) It is fairly soluble in cold water.
- (iii) It is neutral to moist litmus paper.
- (iv) It is less dense than air.

- A. (i), (ii), (iii) and (iv).
- B. (i), (ii) and (iv).
- C. (i), (iii) and (iv).
- D. (i), (ii) and (iii).

19. Which of the options is not a physical property of nitrogen (IV) oxide?

- A. nitrogen (IV) oxide is a reddish-brown gas.
- B. neutral to litmus paper.
- C. It has an irritating smell and is poisonous.
- D. It is easily liquefied into a yellow liquid.

20. Nitrogen combines directly with metals except _____

- A. Cu.
- B. Mg.
- C. Ca.
- D. Al.

21. Pure trioxonitrate (V) acid is colourless but the product of its laboratory preparation is yellow because of the presence of dissolved _____

- A. sulphur.
- B. dinitrogen (I) oxide.
- C. sulphur (IV) oxide.
- D. nitrogen (IV) oxide.

22. What acid was formerly known as aqua fortis?

- A. tetraoxosulphate (VI) acid.
- B. hydrochloric acid.
- C. trioxocarbonate (IV) acid.
- D. trioxonitrate (V) acid.

23. Ammonia reacts with excess chlorine to produce _____

- A. a chloride and free nitrogen.
- B. ammonia chloride.

C. double chloride.

D. a chloride and nitrogen (II) oxide.

24. The diagram drawn is an illustration of the experiment for the _____

A. preparation of nitrogen from air.

B. preparation of nitrogen (II) oxide.

C. preparation of nitrogen from sodium trioxonitrate.

D. preparation of dinitrogen (I) oxide.

25. Ammonia has relatively high boiling point when compared with other similar compounds because _____

A. ammonia is stable.

B. ammonia is easily liquefied.

C. ammonia has a density of 0.880 g cm^{-3} which contains 35% by mass.

D. ammonia has hydrogen bonding.

26. Why is slaked lime used in the preparation of ammonia?

A. It is deliquescent.

B. It is cheap.

C. It is cheap and deliquescent.

D. It is easily decomposed.

27. Nitrogen (IV) oxide is prepared by heating strongly _____

A. lead (II) trioxonitrate (V).

B. lead (II) chloride and trioxonitrate (V) acid.

C. sodium trioxonitrate (V).

D. lead (II) trioxocarbonate (IV) and trioxonitrate (V) acid.

28. Aqueous ammonia _____ the insoluble hydroxides of metals from solutions of their salts.

- A. precipitates
- B. reduces
- C. oxidizes
- D. dries

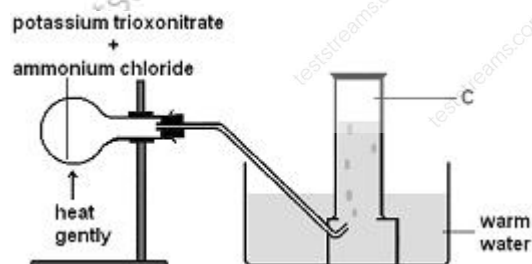
29. What is the products obtained when ammonia reacts with excess air in the presence of a heated platinum catalyst?

- A. Nitrogen and water.
- B. Nitrogen (II) oxide and water.
- C. Nitrogen and hydrogen.
- D. Nitrogen (II) oxide and hydrogen.

30. The following ammonium salts decompose when heated mildly except _____

- A. $(\text{NH}_4)_2\text{SO}_4$.
- B. NH_4NO_2 .
- C. $(\text{NH}_4)_2\text{CO}_3$.
- D. NH_4Cl .

31. The diagram drawn is an illustration of the experiment for the _____



- A. preparation of nitrogen (II) oxide.
- B. preparation of nitrogen (IV) oxide.
- C. preparation of ammonium salts.
- D. preparation of dinitrogen (I) oxide.

32. To test for dinitrogen (I) oxide _____

- A. a reagent is introduced.
- B. a damp litmus paper is used.
- C. a brightly glowing splinter is introduced.
- D. none of the above.

33. During the laboratory preparation of nitrogen, carbon (IV) oxide and oxygen are removed by passing air through _____

- A. soda ash solution.
- B. caustic soda solution.
- C. potassium tetraoxomanganate (VII).
- D. slaked lime.

34. Trioxonitrate (V) acid is manufactured industrially by the _____

- A. reaction of nitrogen (IV) oxide with water.
- B. catalytic reduction of ammonium salts.
- C. oxidation of ammonia with air.
- D. catalytic oxidation of ammonia with excess air.

35. Ammonia is manufactured by _____

- A. Contact process.
- B. Frasch process.
- C. Solvay process.
- D. Haber process.

36. When a copper turning reacts with trioxonitrate (V) acid _____ is produced.

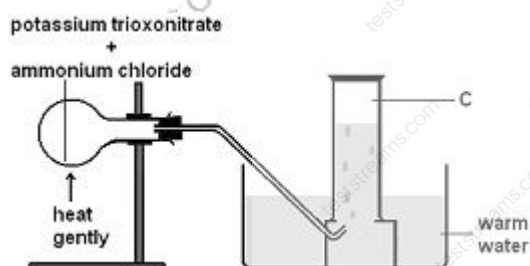
- A. nitrogen (IV) oxide
- B. nitrogen (II) oxide

- C. dinitrogen (I) oxide
D. none of the above

37. Which of the options is not a physical property of nitrogen (IV) oxide?

- A. nitrogen (IV) oxide is a reddish-brown gas.
B. neutral to litmus paper.
C. It has an irritating smell and is poisonous.
D. It is easily liquefied into a yellow liquid.

38. The part labelled C is _____



- A. dinitrogen (I) oxide.
B. nitrogen (II) oxide.
C. nitrogen (IV) oxide.
D. nitrogen.
39. One of these methods produces impure nitrogen.
- A. $\text{NaNO}_{2(\text{aq})} + \text{NH}_4\text{Cl} \rightarrow$
B. $(\text{NH}_4)_2\text{Cr}_2\text{O}_{7(\text{s})} \rightarrow$
C. $\text{NH}_{3(\text{g})} + \text{CuO} \rightarrow$
D. Removing CO_2 and O_2 from dust free air..

40. Which of the following does not play a direct role in the nitrogen cycle?

- A. Electrical discharge in the atmosphere.

- B. Decay of plants and animals.
- C. Erosion.
- D. Bacteria.

41. Which of the following ammonium salts decomposes on heating to produce ammonia?

- (i) ammonium trioxocarbonate (IV).
- (ii) ammonium tetraoxosulphate (VI).
- (iii) ammonium dioxonitrate.
- (iv) ammonium trioxonitrate (V).

- A. (i) and (ii).
- B. (i), (ii) and (iv).
- C. (ii), (iii) and (iv).
- D. (i), (ii), (iii) and (iv).

42. Which of the following catalysts is used in the manufacture of ammonia?

- A. Finely divided iron.
- B. Finely divided nickel.
- C. Manganese (IV) oxide.
- D. Platinum.

43. Which of the following option is not the correct property of ammonia?

- A. A colourless gas with a characteristic choking smell.
- B. It is an alkaline gas, changing moist red litmus paper blue.
- C. It is more denser than air.
- D. It is a very soluble gas.

44. The hydride of nitrogen which is capable of turning red litmus blue makes nitrogen to have an oxidation state of _____

- A. +2.
- B. -2.
- C. +3.
- D. -3.

45. Which of the following options is not a physical property of nitrogen (II) oxide?

- A. It is soluble in water.
- B. It is a colourless, poisonous gas with an unknown smell.
- C. It is slightly denser than air.
- D. It is neutral to litmus.

46. Nitrogen has a very high bond strength and hard to break apart because _____

- A. it is reactive.
- B. it has a single bond between atoms in the molecule.
- C. it's molecular structure.
- D. it has a triple bond between atoms in the molecule.

47. When ammonia reacts with excess chlorine _____ is formed.

- A. ammonium chloride
- B. hydrogen chloride
- C. nitrogen and chlorine
- D. nitrogen (III) chloride

48. Oxidation of nitrogen in Mg_3N_2 is _____

- A. -3.

B. +3.

C. -2.

D. +2.

49. Aqueous ammonia solution used in the laboratory is referred to as aqueous ammonia and not ammonium hydroxide because _____

A. ammonia dissolves in water without forming bonds.

B. ammonia solution easily decomposes and liberates free ammonia when the temperature of the room rises leaving water in the bottle.

C. the bond between ammonia and OH⁻ of water is weakly acidic.

D. ammonia is less dense than air.

50. Nitrogen combines directly with metals except _____

A. Cu.

B. Mg.

C. Ca.

D. Al.

51. Nitrogen (I) oxide rekindles a brightly glowing splint just like oxygen, but it is different from oxygen because _____

A. it is less dense than oxygen.

B. it is fairly soluble in water.

C. it thermally decomposes before it rekindles glowing splint.

D. it is only laughing gas.

52. The following chemical compounds except _____ are used to produce nitrogen.

A. sodium trioxonitrate

B. ammonium dioxonitrate (III)

C. ammonium heptaoxodichromate (VI)

D. dinitrogen (I) oxide

53. Which of the following are properties of nitrogen?

(i) Nitrogen is a colourless, odourless and tasteless gas

(ii) Pure nitrogen is slightly lighter than air

(iii) It is slightly soluble in water

(iv) Has very high melting and boiling point

A. (i), (ii) and (iv).

B. (i), (ii), (iii) and (iv).

C. (i), (ii), and (iii).

D. (ii), (iii) and (iv).

54. X acid is colourless when pure, but often yellowish due to dissolved nitrogen (iv) oxide by slight decomposition of the acid. X is _____

A. H_3PO_4 .

B. HCl.

C. HNO_3 .

D. H_2SO_4 .

TOPIC: ORGANIC CHEMISTRY

DIRECTION: Choose the correct options from the lettered options.

1. When an alcohol reacts with an acid. The products are _____

- A. an ester and water.
- B. an alkanolic acid and water.
- C. an alkane and a salt.
- D. an ester and ether.

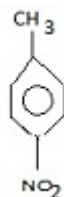
2. Which element is present in all organic compounds?

- A. Carbon.
- B. Nitrogen.
- C. Oxygen.
- D. Phosphorus.

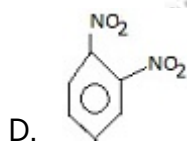
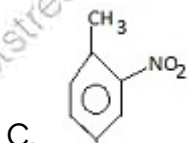
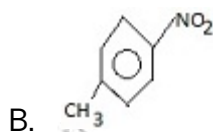
3. Alkanoates are produced from alkanols by _____

- A. fermentation.
- B. saponification.
- C. oxidation.
- D. esterification.

4. The structure of 2-nitro methylbenzene is _____



A.



5. Which of the following statements concerning ethene (C_2H_4) is correct?

- A. It readily dissolves in water.
- B. It readily undergoes substitution reactions with bromine.
- C. It readily undergoes addition reactions with bromine.
- D. It is a saturated hydrocarbon.

6. Locally prepared soap in which wood ash is used as the base is usually soft because the wood ash contains a lot of _____

- A. sodium ions.
- B. potassium ions.
- C. lithium ions.
- D. calcium ions.

7. Which of the following hydrocarbons will produce benzene on polymerization?

- A. Butane.
- B. Ethyne.
- C. Hexane.
- D. Hexyne.

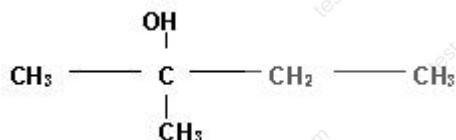
8. What substance is made up of monomers joined together in long chains?

- A. Ketone.
- B. Protein.
- C. Ester.
- D. Acid.

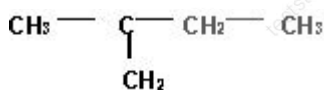
9. An example of a polysaccharide is _____

- A. dextrose.
- B. mannose.
- C. glucose.
- D. starch.

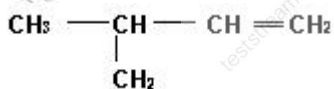
10. The major product of the dehydration of the compound in the diagram is _____.



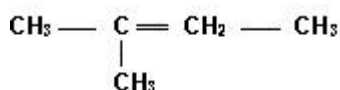
A.



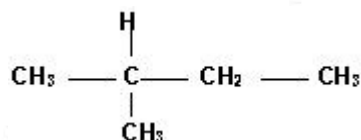
B.



C.



D.



11. Which of the following substances is trihydric?

- A. Ethanol.
- B. Glycol.
- C. Glycerol.
- D. Phenol.

12. What is the product of the reaction between ethanol and excess acidified KMnO_4 solution?

- A. $\text{CH}_2 = \text{CH}_2$.
- B. CH_3COOH .
- C. $\text{CH}_3\text{-CH}_3$.
- D. $\text{CH}_3\text{-OCH}^3$.

13. What is the name of the compound that has molecular formula C_6H_6 ?

- A. Butane.
- B. Butene.
- C. Benzene.
- D. Butyne.

14. Ethene when passed through concentrated H_2PO_4 is rapidly dissolved. The product is diluted with water and then warmed to produce _____

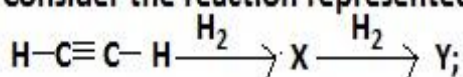
- A. ethanol.
- B. diethyl ether.
- C. ethanal.
- D. diethyl sulphate.

15. Which of the following hydrocarbons will undergo substitution and addition reactions?

- A. C_2H_2

- B. C_2H_4 .
 C. C_4H_{10} .
 D. C_6H_6 .

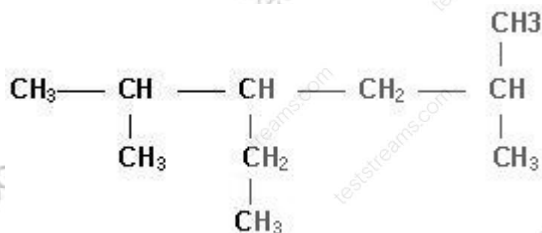
16. Consider the reaction represented by the following equation:



X and Y respectively are

- A. ethene and ethane.
 B. ethane and ethene.
 C. ethyne and ethene.
 D. ethene and propene.

17. The IUPAC nomenclature of the organic compound with the given structural formula is _____



- A. 3-ethyl-2,5-dimethylhexane.
 B. 4-ethyl-2,5-dimethylhexane.
 C. 3-ethyl-,1,1,4-dimethylpentane.
 D. 3-ethyl-2,5,5-trimethylpentane.

18. Which compounds in the options below are isomers?

- A. 1-propanol and 2-propanol.
 B. Methanoic acid and ethanoic acid.
 C. Methanol and methanol.

D. Ethane and ethanol.

E. Ethane and ethene.

19. The reaction $\text{CH}_2=\text{CH}_2 + \text{H}_2 \rightarrow \text{CH}_3\text{CH}_3$ is an example of _____

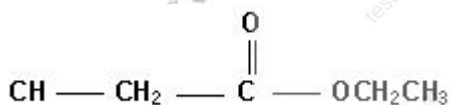
A. substitution.

B. addition.

C. esterification.

D. fermentation.

20. The compound given is an



A. ether.

B. alkanol.

C. ester.

D. alkanal.

21. Compound N reacts with sodium metal to produce a gas that gives a 'pop' sound with a burning splint. N also reacts with ethanoic acid to give a sweet smelling liquid. Compound N is _____

A. an alkanol.

B. an alkanoate.

C. an alkane.

D. an alkanolic acid.

22. Which of the following compounds is aromatic?

A. Benzene

B. Cyclobutane

C. Cyclopentane

D. Hexane

23. How many isomers does pentane have?

A. 3.

B. 4.

C. 5.

D. 6.

24. **Alkanol + Alkanoic acid** \rightleftharpoons **Ester + Water**

The reverse reaction of the equation is known as _____

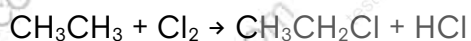
A. fermentation.

B. hydration.

C. hydrolysis.

D. oxidation.

25. The reaction below is a type of _____



A. an addition reaction.

B. a substitution reaction.

C. a saponification reaction.

D. an esterification reaction.

26. The products of the fermentation of sugar are ethanol and _____

A. water.

B. oxygen.

C. carbon dioxide.

D. sulfur dioxide.

27. The carbon atoms in ethane are _____

- A. sp^3 hybridized.
- B. sp hybridized.
- C. sp^2 hybridized.
- D. not hybridized.

28. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

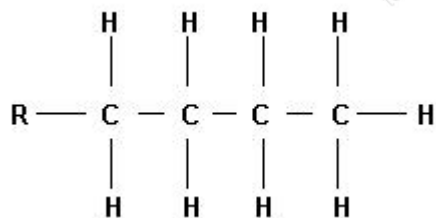
The reaction represented by the equation above using zymase catalyst at a temperature of $25^\circ C$ is known as _____.

- A. hydrolysis
- B. fermentation
- C. reduction
- D. condensation

29. Catalytic hydrogenation of oil results in the production of _____

- A. soaps.
- B. detergents.
- C. margarine.
- D. buffers.

30. The compound with the structure given, where R is an alkyl group, is classified as _____



- A. an alkanolic acid.
- B. an unsaturated compound.

C. an alkyl halide.

D. an alkane.

31. Which of the following formulae is that of a dicarboxylic acid?

A. $(\text{CH}_3\text{CH}_2)_2\text{CHCOOH}$

B. $\text{CH}_2(\text{OH})_2$.

C. $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$

D. $\text{CH}_2(\text{COOH})_2$.

32. An advantage of detergent over soap is that detergents _____

A. are readily available.

B. are in powdered form.

C. are non-biodegradable.

D. lather readily with water.

33. Which of these reagents can confirm the presence of a triple bond?

A. Copper (I) chloride.

B. Acidified KMnO_4 .

C. Bromine gas.

D. Bromine water.

34. Which of the following compounds exhibits both structural isomerism and cis - trans isomerism?

A. C_4H_8 .

B. CH_3OCH_3 .

C. C_5H_{12} .

D. C_6H_6 .

35. Which of the following compounds is a member of the series with the general molecular formula C_nH_{2n-2} ?

- A. C_2H_6 .
- B. C_3H_4 .
- C. C_3H_6 .
- D. C_3H_8 .

36. Which of the following exhibits resonance?

- A. Benzene.
- B. Butane.
- C. Pentene.
- D. Octane.

37. The following are miscible with water except _____

- A. ethylethanoate.
- B. methanol.
- C. ethanoic acid.
- D. methanoic acid.

38. During saponification, brine is added to soap paste in order to _____

- A. separate glycerol from the soap curds.
- B. prevent the formation of insoluble scum when used with hard water.
- C. get the soap homogenized.
- D. increase lather formation in laundry work.

39. The products of fermentation of sugar are _____

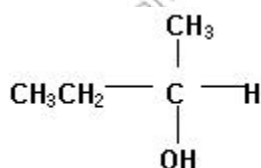
- A. carbon (IV) oxide and water.
- B. ethanol and carbon (IV) oxide.

- C. ethanol and water.
D. ethanol and enzymes.

40. In which of the following processes are larger molecules broken down into smaller molecules?

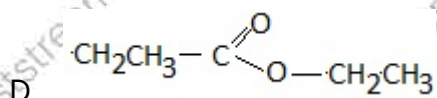
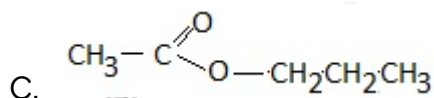
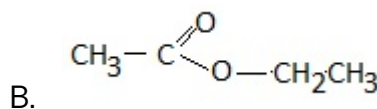
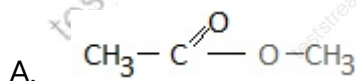
- A. Vulcanization of rubber.
B. Hydrogenization of palm oil.
C. Hydrolysis of starch.
D. Polymerization.

41. The compound given is a _____



- A. tertiary alkanol.
B. primary alkanol.
C. glycol.
D. secondary alcohol.

42. Which of the following structures represents that of ethylethanoate?



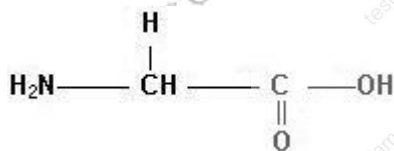
43. The by-product of the fermentation of sugar to ethanol is _____
- A. propane-1,2,3-triol.
 - B. ethyl ethanoate.
 - C. ethanedioic acid.
 - D. carbon (IV) oxide.
44. Which molecule contains a total of three carbon atoms?
- A. 2-methylpropane.
 - B. 2-methylbutane.
 - C. Propane.
 - D. Butane.
45. When ethanol undergoes bacterial oxidation, it becomes sour due to _____
- A. accumulation of bacteria in the ethanol.
 - B. incomplete fermentation of the alkanol.
 - C. long exposure of the alkanol to air.
 - D. presence of ethanoic acid in the alkanol.
46. Fats and oils are used as raw materials in the following industries except _____
- A. paint industry.
 - B. plastic industry.
 - C. margarine industry.
 - D. cosmetic industry.
47. Which class of organic compound is represented by the equations?
- $R \frac{3}{4} OH$.
- A. Acids.
 - B. Alcohols.

- C. Esters.
- D. Ethers.

48. Which statement explains why the element carbon forms so many compounds?

- A. Carbon atoms combine readily with oxygen.
- B. Carbon atoms have a very high electronegativity.
- C. Carbon readily forms ionic bonds with other carbon atoms.
- D. Carbon readily forms covalent bonds with other carbon atoms.

49. What is the IUPAC name of the following compound?



- A. 1 - aminoethanoic acid.
 - B. 1 - aminomethanoic acid.
 - C. 2 - aminoethanoic acid.
 - D. 2 - aminomethanoic acid.
50. Which substance is a hydrocarbon?

- A. H_2 .
- B. CO .
- C. $\text{C}_6\text{H}_{12}\text{O}_6$.
- D. C_8H_{18} .

51. Aromatic and aliphatic hydrocarbons can be distinguished from each other by

- A. action of bromine.
- B. use of polymerization reaction.

- C. action of heat.
- D. use of oxidation reaction.

52. Which of these polymers occur naturally?

- A. Starch and nylon.
- B. Starch and cellulose.
- C. Protein and nylon.
- D. Protein and plastic.

53. Which property is generally characteristic of an organic compound?

- A. low melting point.
- B. high melting point.
- C. soluble in polar solvent.
- D. insoluble in nonpolar solvent.

54. Which of the following is true concerning the properties of benzene and hexane?

- A. Both undergo substitution reaction.
- B. Both undergo addition reaction.
- C. Both are solids.
- D. Both decolourise bromine water.

55. The following options are characteristics of enzymes except _____

- A. they are inorganic compounds.
- B. they are organic compounds.
- C. they are reaction specific.
- D. solubility in water.

56. Which of the following is a property of ethanol?

- A. It is colourless.
- B. It is miscible with water.
- C. Its boiling point is 78°C .
- D. All of the above.

57.



- A. isomers.
- B. esters.
- C. carboxylic acids.
- D. polymers.

58. Ethanol can easily be produced by _____

- A. catalytic oxidation of methane.
- B. destructive distillation of coal.
- C. fermentation of starch.
- D. distillation of starch solution.

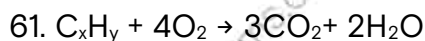
59. Which compound is a saturated hydrocarbon?

- A. ethane.
- B. ethene.
- C. ethyne.
- D. ethanol.

60. Polyvinyl chloride is used to produce _____

- A. bread.

- B. ink.
- C. pencils.
- D. pipes.



The hydrocarbon C_xH_y in the reaction above is _____

- A. propyne.
- B. propanone.
- C. propene.
- D. propyl.

62. If the third member of a homologous series is C_3H_8 , the fifth member will be _____

- A. C_5H_9 .
- B. C_5H_{10} .
- C. C_5H_{11} .
- D. C_5H_{12} .

63. How many isomers can be obtained from C_4H_{10} ?

- A. 0.
- B. 1.
- C. 2.
- D. 3.

64. Which compound is an organic acid?

- A. CH_3OH
- B. CH_3OCH_3
- C. CH_3COOH
- D. CH_3COOH_3

65. An example of a buffer solution is _____

- A. ethanoic acid and sodium ethanoate.
- B. tetraoxosulphate (VI) acid and Sodium hydroxidet.
- C. hydrochloric acid and Aqueous ammonia.
- D. bromine water and Benedict's Solution.

66. Compared to the rate of organic reactions, the rate of inorganic reactions generally is _____

- A. slower because organic particles are low.
- B. slower because organic particles contain covalent bonds.
- C. faster because organic particles are ions.
- D. faster because inorganic particles contain both ionic and covalent bonds.

67. An undesirable paraffin in the petroleum industry which is particularly prone to knocking is _____

- A. iso-octane.
- B. n-heptane.
- C. iso-heptane.
- D. n-octane.

68. which pair of hydrocarbons does each compound contain only one double bond per molecule?

- A. C_2H_2 and C_2H_6 .
- B. C_2H_2 and C_3H_6
- C. C_4H_8 and C_2H_4 .
- D. C_6H_6 and C_7H_8 .

69. Cellulose, starch, proteins, and rubber are _____
- A. polymers of the same monomers, C, H, and O.
 - B. polymeric macromolecules.
 - C. polymeric micromolecules.
 - D. copolymers of glucose, amino acids, and isoprene.

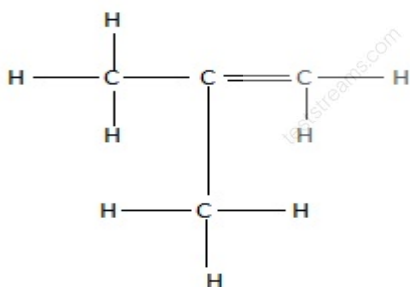
70. The IUPAC name of $C_2H_5COOC_2H_5$ is _____

- A. ethylethanoate.
- B. ethylpropanoate.
- C. propylethanoate.
- D. propylpropanoate.

71. Ethanoic acid is _____

- A. tribasic.
- B. monobasic.
- C. unionizable.
- D. dibasic.

72. What is the IUPAC name of the compound with this structure?



- A. 2-methyl butane.
- B. 2-methyl prop-2-ene.
- C. 2-methyl prop-1-ene.
- D. but-1-ene.

73. Which of these compounds will react with NaOH to form a salt?

- A. $\text{CH}_3\text{CH}_2\text{COOH}$.
- B. $(\text{CH}_3)_3\text{COH}$.
- C. $\text{CH}_3\text{CH} = \text{CH}_2$.
- D. $\text{C}_6\text{H}_{12}\text{O}_6$.

74. Which of the following carbohydrates do not occur in crystalline form?

- A. Fructose
- B. Glucose
- C. Sucrose
- D. Cellulose

75. How many carbon atoms are there in a benzene ring?

- A. 4.
- B. 5.
- C. 6.
- D. 7.

76. Which of the following substances is not obtained during the destructive distillation of coal?

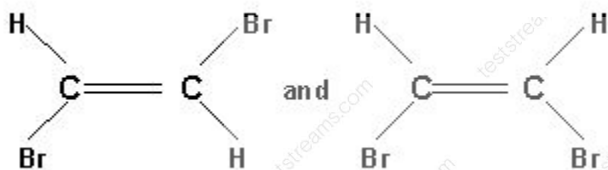
- A. Pyroligneous acid.
- B. Coal tar.
- C. Ammoniacal liquor.
- D. Coal gas.

77. If an element R belongs to the same group as sodium, an aqueous solution of ROH will _____

- A. be neutral.

- B. be acidic.
- C. be coloured.
- D. have pH greater than 7.

78. What is the relationship between the components represented by the following structures?



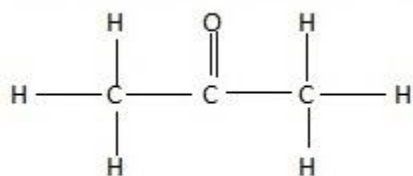
- A. They are allotropes.
- B. They are dimers.
- C. They are polymers.
- D. They are geometric isomers.

79. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$

The IUPAC name for the compound above is _____

- A. ethoxymethane.
- B. methoxyethane.
- C. propylmethanoate.
- D. methylbutanoate.

80. Consider the following compound



The compound with the structure above is an _____

- A. alkanal.
- B. alkanone.

- C. alkanoate.
- D. alkanoic acid.

81. 2-methylprop-1-ene is an isomer of _____

- A. but-2-ene.
- B. 2-methylbut-2-ene.
- C. pent-1-ene.
- D. 2-methylbut-1-ene.

82. Which of the following mixtures are produced when high boiling point petroleum fractions are cracked for an increased yield of gasoline?

- A. Alkanes.
- B. Alkanes and alkenes.
- C. Alkanes and alkynes.
- D. Alkenes.

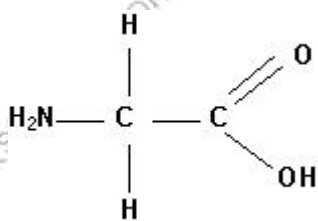
83. Which of the following substances give a brick red precipitate when heated with Fehlings solution?

- A. Alkanoates.
- B. Carbohydrates.
- C. Fats and Oils.
- D. Proteins.

84. An example of a secondary amine is _____

- A. propylene.
- B. methylamine.
- C. di-butyl amine.
- D. trimethylamine.

85. The two functional groups in the compound given are ____ and ____



- A. alcohol and amine.
- B. acid and amine.
- C. aldehyde and acid.
- D. acid and base.

86. Dehydration of ethanol produces a gas X which has a general molecular formula,

- A. $(CH_2)_n$.
- B. C_nH_{2n} .
- C. C_nH_{2n-2} .
- D. C_nH_{2n+1} .

87. What is the maximum number of covalent bonds that an atom of carbon can form?

- A. 1
- B. 2
- C. 3
- D. 4

88. An acid present in protein is called _____.

- A. lactic acid
- B. amino acid
- C. propanoic acid
- D. palmitic acid

89. In a molecule of CH₄, the hydrogen atoms are spatially oriented towards the centres of a regular _____ -

- A. pyramid.
- B. tetrahedron.
- C. square.
- D. rectangle.

90. Which of the following hydrocarbons is unsaturated?

- A. Ethane.
- B. Benzene.
- C. 2-methyl butane.
- D. 2,2,4 - bimethyl pentane.

91. A homologous series is one in which _____.

- i. all the components can be represented by one general formula
- ii. successive members differ from one another by CH₂
- iii. physical properties differ only in terms of the number of carbon atoms per molecule

- A. i and ii only
- B. ii only
- C. i and iii only
- D. i, ii, & iii

TOPIC: OXYGEN. OXIDES. HYDROGEN PEROXIDES. OZONE

DIRECTION: Choose the correct options from the lettered options.

1. Which of these gases in the options below, has the following physical properties?

(i) Pale blue syrup liquid.

(ii) Dissolves in water to give a very weak acidic solution.

(iii) Boils, with decomposition, at 150°C and freezes at about -0.9°C.

A. O₂

B. H₂O₂

C. H₂

D. N₂

2. Oxygen is prepared in the laboratory by _____, _____ and _____.

A. reaction of potassium trioxochlorate (V) with hydrogen peroxide and oxidation of hydrogen peroxide

B. decomposition of potassium trioxochlorate (V), hydrogen peroxide and reduction of hydrogen peroxide

C. decomposition of potassium trioxochlorate (IV), hydrogen peroxide and oxidation of hydrogen peroxide

D. decomposition of potassium trioxochlorate (V), hydrogen peroxide and oxidation of hydrogen peroxide

3. Which of the following are industrial preparation of oxygen?

(i) Liquefaction of air

(ii) Fractional distillation of the resultant liquid air

(iii) Oxidation of hydrogen peroxide

A. (i), (ii), (iii)

B. (ii) & (iii) only

C. (i) & (ii) only

D. (i) only

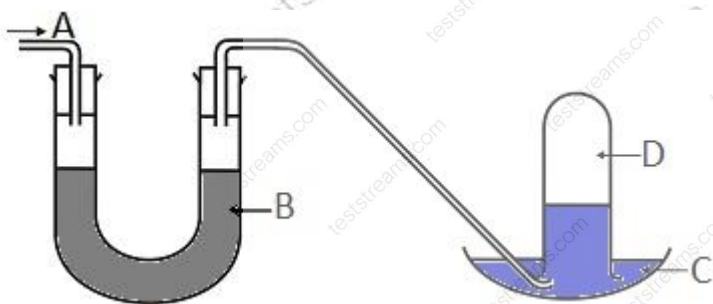
4. The following are uses of hydrogen peroxide except _____.

- A. used as an antiseptic
- B. used in bleaching delicate materials
- C. used for burning diesel oil in engines of submerged submarines
- D. used in ventilating stuffy chambers

5. Hydrogen peroxide can be oxidized by chlorine. What is the equation for the reaction?

- A. $\text{Cl}_{2(\text{g})} + \text{H}_2\text{O}_{2(\text{aq})} + \text{OH}^-_{(\text{aq})} \rightarrow \text{Cl}^-_{(\text{aq})} + 2\text{H}_2\text{O}_{(\text{l})} + \text{O}_{2(\text{g})}$
- B. $\text{Cl}_{2(\text{g})} + \text{H}_2\text{O}_{2(\text{aq})} + 2\text{OH}^-_{(\text{aq})} \rightarrow 2\text{ClO}_2^-_{(\text{aq})} + 2\text{H}_2\text{O}_{(\text{l})} + \text{O}_{2(\text{g})}$
- C. $\text{Cl}_{2(\text{g})} + \text{H}_2\text{O}_{2(\text{aq})} + 2\text{OH}^-_{(\text{aq})} \rightarrow 2\text{ClO}_3^-_{(\text{aq})} + 2\text{H}_2\text{O}_{(\text{l})} + \text{O}_2$
- D. $\text{Cl}_{2(\text{g})} + \text{H}_2\text{O}_{2(\text{aq})} + 2\text{OH}^-_{(\text{aq})} \rightarrow 2\text{Cl}^-_{(\text{aq})} + 2\text{H}_2\text{O}_{(\text{l})} + \text{O}_{2(\text{g})}$

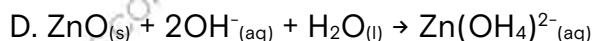
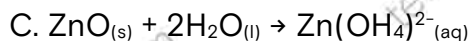
6. From the diagram drawn the part labelled A is _____.



- A. oxygen
- B. hydrogen
- C. calcium chloride
- D. sulphur

7. Zinc oxide, ZnO is amphoteric. It dissolves in alkali to give the ion $\text{Zn}(\text{OH})_4^{2-}$, what is the equation for the reaction?

- A. $\text{ZnO}_{(\text{s})} + \text{OH}^-_{(\text{aq})} + \text{H}_2\text{O}_{(\text{l})} \rightarrow \text{Zn}(\text{OH})_4^{2-}_{(\text{aq})}$
- B. $2\text{ZnO}_{(\text{s})} + 2\text{OH}^-_{(\text{aq})} + 2\text{H}_2\text{O}_{(\text{l})} + 2\text{H}^+ \rightarrow 2\text{Zn}(\text{OH})_4^{2-}_{(\text{aq})}$



8. Why does reactive metals like sodium not react with liquid oxygen?

A. At the temperature of liquid oxygen (less than 90K) the sodium and oxygen have sufficient energy to get over the energy barrier.

B. At the temperature of liquid oxygen (more than 90K) the sodium and oxygen have insufficient energy to get over the energy barrier.

C. At the temperature of liquid oxygen (less than 90K) the sodium and oxygen have insufficient energy to get over the energy barrier.

D. At the temperature of liquid oxygen (more than 90K) the sodium and oxygen have sufficient energy to get over the energy barrier.

9. Which of the following are tests for oxygen?

(i) Odourless

(ii) Slightly soluble

(iii) Produces reddish brown fumes of nitrogen (IV) oxide

(iv) Residual gas

A. (i) & (iv) only

B. (i), (ii), (iii)

C. (ii), (iii), (iv)

D. (ii) & (iv) only

10. The industrial preparation of oxygen from air is by _____

A. condensation.

B. crystallization.

C. distillation.

D. fractional distillation.

11. Hydrogen peroxide can be oxidized by chlorine. What ion does chlorine turn into when it has been reduced?

- A. Chlorate (ClO_3^-) ion
- B. Chloride (Cl^-) ion
- C. Chlorine (Cl_2) ion
- D. Chlorate (ClO_2^-) ion

12. Which of the following is an allotropic form of oxygen?

- A. H_2O_2 .
- B. HgO .
- C. NO_2 .
- D. O_3 .

13. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. What mass of oxygen was combined with the sodium?

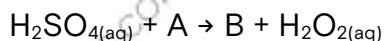
- A. 1.50g
- B. 1.15g
- C. 1.60g
- D. 2.75g

14. What is the value of A in the reaction given below?



- A. BaSO_4
- B. H_2O
- C. BaSO_3
- D. H_2O_2

15. The reaction below is the laboratory preparation of hydrogen peroxide;



What is the value of A?

- A. BaO(s)
- B. BaO₂(s)
- C. BaSO₃(s)
- D. BaSO₄(s)

16. Which of the following are types of oxide?

- (i) Acidic oxide
- (ii) Basic oxide
- (iii) Amphoteric oxide
- (iv) Neutral oxide

- A. (i), (ii), (iii)
- B. (i) & (ii)
- C. (i), (ii), (iii), (iv)
- D. (ii) only

17. Which of the gases in the options below, has the following physical properties?

- (i) Pale-blue gas
- (ii) Smells like dilute chlorine
- (iii) Poisonous at concentration above 100 parts per million.
- (iv) Slightly soluble in water but dissolves in turpentine.

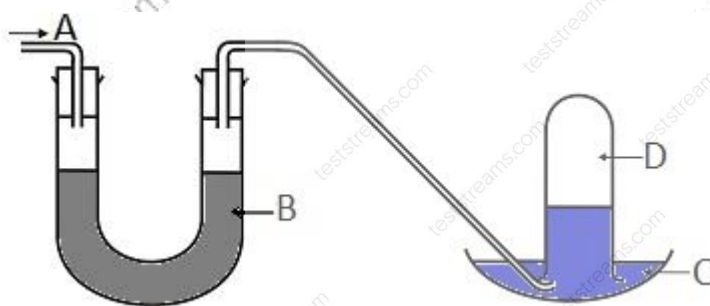
- A. hydrogen sulphide
- B. oxygen
- C. hydrogen
- D. ozone

18. Which of these gases has the following physical properties?

- (i) Diatomic gas
- (ii) Colourless, tasteless and odourless
- (iii) Slightly soluble in water
- (iv) Liquefies easily

- A. CO
- B. O₂
- C. N₂
- D. H₂

19. From the diagram drawn the part labelled B is _____.

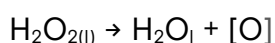
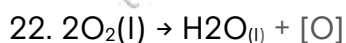
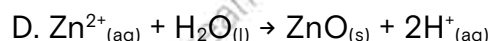
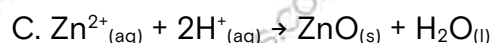
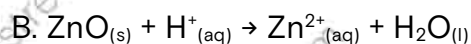
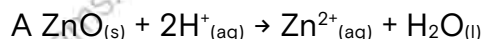


- A. anhydrous calcium hydroxide and concentrated tetraoxosulphate (VI) acid
- B. anhydrous calcium chloride and dilute tetraoxosulphate (VI) acid
- C. anhydrous calcium chloride and concentrated tetraoxosulphate (VI) acid
- D. anhydrous calcium chloride and dilute tetraoxosulphate (VI) acid

20. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. What is the ratio of the moles of the elements?

- A. 2 moles oxygen to 1 mole sodium
- B. 1 mole oxygen to 2 moles sodium
- C. 1 mole oxygen to 0.7 moles sodium
- D. 0.5 moles oxygen to 1 mole sodium

21. Zinc oxide, ZnO, is amphoteric. It dissolves in alkali to give the ion $\text{Zn}(\text{OH})_2^-$. What is the equation for the reaction of the oxide with hydrogen ions?



In the reaction given above, hydrogen peroxide is acting as _____.

A. hydrating agent

B. oxidizing agent

C. reducing agent

D. drying agent

23. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. How many moles of oxygen atom is involved in the reaction?

A. 0.094 mol

B. 0.100 mol

C. 0.072 mol

D. 0.172 mol

24. In the laboratory, ozone can be made by _____.

A. passing oxygen over nickel catalyst

B. passing oxygen through a strong electric field

C. passing oxygen over potassium chlorate

D. passing oxygen through liquefied air

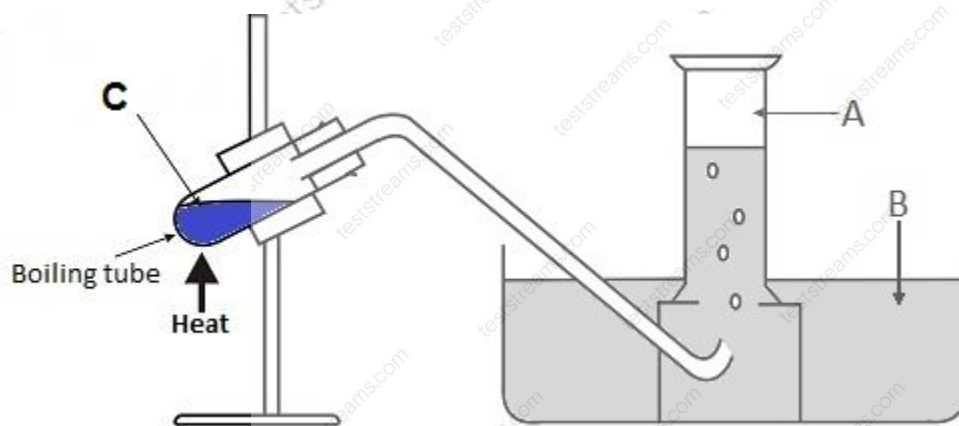
25. Pure ozone can be obtained as a blue liquid by _____.

- A. cooling ozonized oxygen to -102°C
- B. cooling ozonized oxygen to -112°C
- C. passing electric discharge to ozonized oxygen
- D. passing ozonized oxygen through calcium oxide

26. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. How many moles of sodium were used?

- A. 0.0696 mol
- B. 0.0652 mol
- C. 0.0500 mol
- D. 0.0120 mol

27. From the diagram drawn the part labelled C is _____.

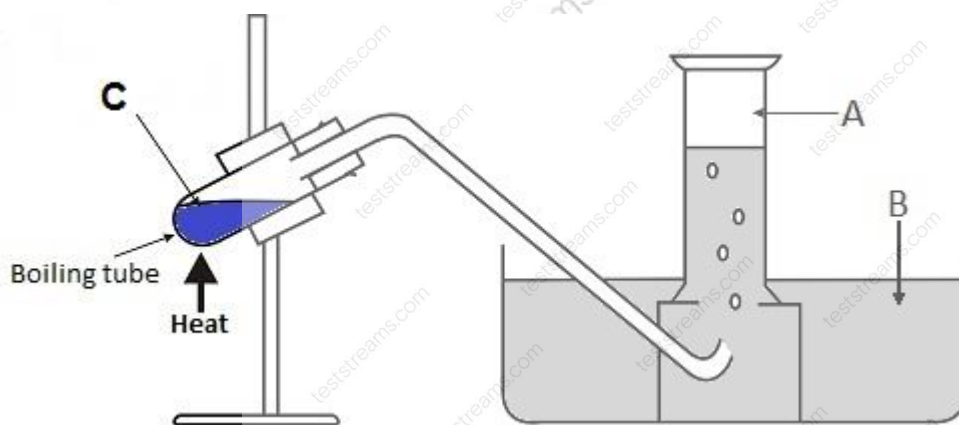


- A. hydrogen peroxide + manganes (IV) oxide
- B. potassium trioxochlorate (V) + manganes (IV) oxide
- C. hydrogen peroxide + manganes (IV) oxide
- D. potassium trioxochlorate (III) + manganes (IV) oxide

28. Which gas is obtained by cooling ozonized oxygen to -112°C ?

- A. O_2
- B. O_3
- C. H_2
- D. N_2

29. From the diagram drawn, the part labelled A is _____.



- A. water
- B. hydrochloric gas
- C. hydrogen peroxide
- D. oxygen

30. Which of these gases has the following chemical characteristics?

- (i) Combines with other elements except rare gases
- (ii) Combines with some halogens
- (iii) Forms multiple bonds with itself

- A. CO
- B. N_2
- C. H_2
- D. O_2

31. Which of these gases in the options below, has the following chemical characteristics?

(i) Decomposes to form water and oxygen.

(ii) A strong oxidizing agent reacting with acidified potassium iodide to form iodine.

(iii) A reducing agent reacting with chlorine and silver oxide to produce hydrochloric acid and silver.

A. O_2

B. NO_2

C. H_2O_2

D. H_2

32. Ozone, O_3 , has a _____.

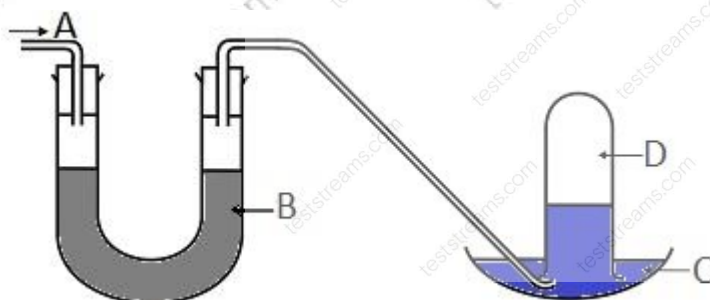
A. triangular shape

B. pyramidal shape

C. coplanar shape

D. linear shape

33. From the diagram drawn the part labelled D is _____.



A. dry oxygen

B. dry hydrogen

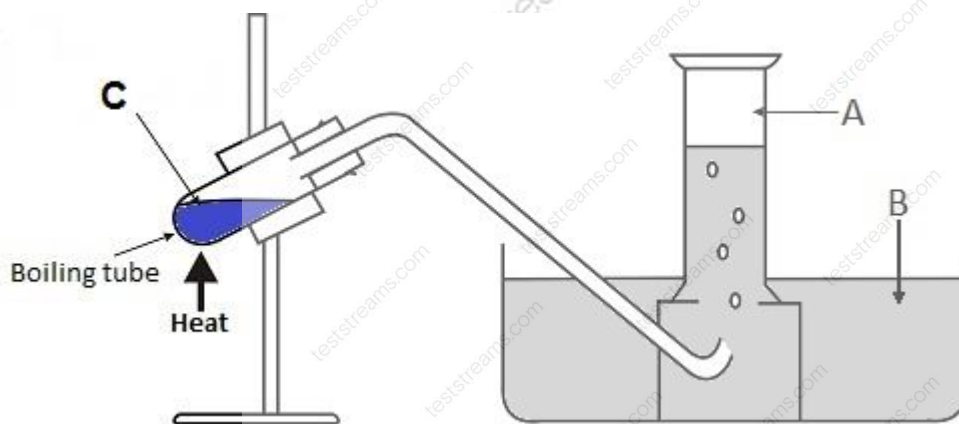
C. nitrogen oxide

D. dry chlorine

34. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. What is the empirical formula of the compound?

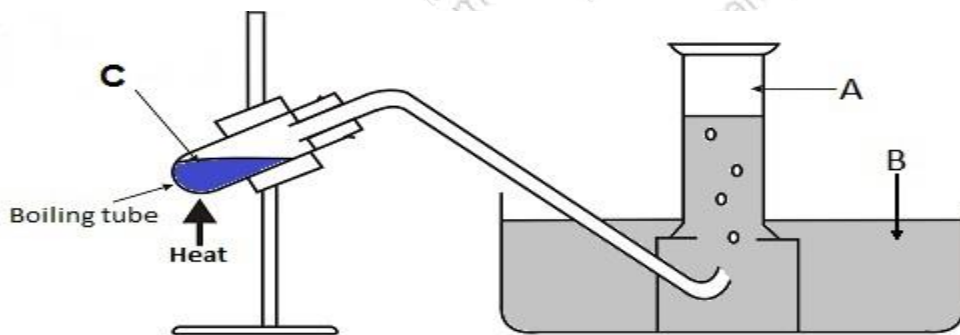
- A. NaO
- B. Na₂O
- C. NaO₂
- D. NaO₄

35. From the diagram drawn, the part labelled B is _____



- A. water
- B. hydrogen peroxide
- C. hydrogen chloride
- D. dilute hydrogen nitrate

36. The diagram drawn is an illustration of an experiment for the _____.



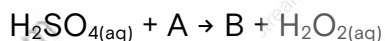
- A. preparation of oxygen from potassium trioxochlorate (III)
- B. preparation of oxygen from hydrogen peroxide
- C. preparation of oxygen from potassium trioxochlorate (IV)
- D. preparation of oxygen from potassium trioxochlorate (V)

37. Which of the following are the uses of ozone?

- (i) Good bleaching agent
- (ii) Ventilating areas which get very little fresh air
- (iii) Disinfectant in water and sewage purification
- (iv) In air-conditioning plants

- A. (i), (ii), (iii)
- B. (i) & (ii) only
- C. (i), (ii), (iii) & (iv)
- D. (ii), (iii) & (iv) only

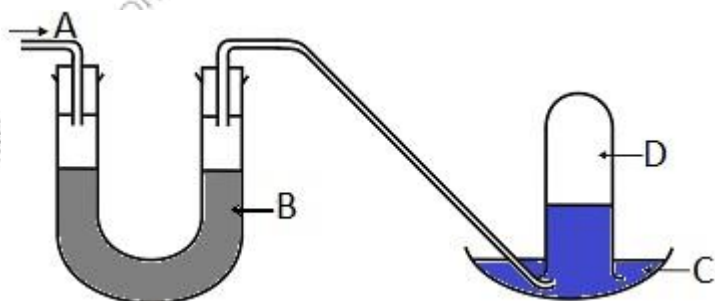
38. The reaction below is the laboratory preparation of hydrogen peroxide;



What is the value of B?

- A. $\text{BaSO}_3(\text{s})$
- B. $\text{BaSO}_4(\text{s})$
- C. $\text{BaO}(\text{s})$
- D. $\text{BaO}_2(\text{s})$

39. From the diagram drawn the part labelled C is _____.



- A. mercury
- B. dilute hydrogen chloride
- C. water
- D. mercury oxide

40. Oxygen in air can be absorbed by passing it through _____.

- A. caustic soda
- B. alkaline pyrogallol
- C. 95% ethanol
- D. washing soda

TOPIC: PHOSPHORUS AND SILICON COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. Lime soda glass is made from the mixture of _____

- A. silicon, washing soda and limestone.
- B. metallic trioxosilicates (IV), silica and limestone.
- C. silica, caustic soda and limestone.
- D. silica, washing soda and limestone.

2. $P_{4(s)} + 5O_{2(g)} \rightarrow$

The product of the given reaction above is _____

- A. $P_4O_{8(g)}$
- B. $P_4O_{6(g)}$
- C. $P_4O_{10(g)}$
- D. $P_4O_{12(g)}$

3. When sodium trioxosilicate (IV) dissolves in hot water a viscous liquid is formed known as _____

- A. flint glass.
- B. silica gel.
- C. lime-soda glass.
- D. water-glass

4. When an acid is added to a solution of water glass and heated to dehydration, _____ is formed.

- A. pyrex
- B. lime soda glass
- C. silica gel
- D. flint glass

5. Silica gel is commonly used in packaging electronics because _____

- A. it extends the life of the integrated circuits in them.
- B. it keeps away rats and cockroaches.
- C. it is stable in porous packs.
- D. it is hygroscopic.

6. Heating silicon in air forms _____

- A. trioxosilicates (IV).
- B. silicon.
- C. silicon (IV) oxide.
- D. silicon tetrachloride.

7. Silicon (IV) oxide occurs naturally in three main crystalline forms except _____

- A. slate.
- B. quartz.
- C. tridymite.
- D. cristobalite.

8. The reaction of heated silicon (IV) oxide and metallic salt forms _____

- A. trioxosilicates (IV) and liquid.
- B. metallic trioxosilicates (IV) and gas.
- C. metallic trioxosilicates (IV) and liquid.
- D. trioxosilicates (IV) and gas.

9. Silicon (IV) oxide is used in the following except _____

- A. optical lenses and heat resistant apparatus.
- B. mortar, cement, concrete, glass and refractory silica bricks.
- C. making bronze and steel alloys.
- D. making dry antiseptic dressings.

10. From the diagram drawn, the part labelled A is _____

- A. iron.
- B. lead.
- C. zinc.
- D. copper.

11. An example of heat resistant glass is _____

- A. pyrex.
- B. lime soda glass.
- C. water glass.
- D. flint glass.

12. The low ignition temperature of white phosphorus is _____

- A. 250°C.
- B. 100°C.
- C. 44°C.
- D. 35°C.

13. Water glass is a _____

- A. solid.
- B. amorphous solid.
- C. viscous liquid.
- D. brittle cast.

14. To improve the quality of glass _____ is added.

- A. metallic oxides and coke
- B. powdered glass and coke

- C. powdered glass and metallic trioxocarbonate (IV)
- D. silicon (IV) oxide and coke

15. What is the chemical formula of phosphine?

- A. PH.
- B. P₂H₄.
- C. P₃H₆.
- D. PH₃.

16. A little white phosphorus on a deflagrating spoon burns in chlorine to produce _____

- A. phosphorus trichloride.
- B. phosphorus pentachloride.
- C. a mixture of phosphorus trichloride and phosphorus pentachloride.
- D. phosphine.

17. PCl₅ is formed when _____

- A. phosphorus reacts with limited supply of chlorine.
- B. phosphorus reacts with excess supply of chlorine.
- C. chlorine reacts with limited supply of phosphorus.
- D. all of the above.

18. The tendency of phosphorus to glow in the dark is called _____

- A. fluorescence.
- B. efflorescence.
- C. phosphorescence.
- D. deliquescence

19. White phosphorus is stored in the laboratory _____

- A. under paraffin oil.
- B. in a dessicator.
- C. under water.
- D. in the fume chamber.

20. When a mixture of dry sand and magnesium powder is heated _____ is formed.

- A. silica
- B. trioxosilicate (V)
- C. silicon.
- D. amorphous silicon

21. Which allotrope of phosphorus is not stable at room temperature?

- A. Black.
- B. Red.
- C. White.
- D. Green.

22. The following options are allotropes of phosphorus except _____

- A. Green.
- B. White.
- C. Black.
- D. Red.

23. Which compound has a characteristic smell like that of rotten fish?

- A. H_2S .
- B. NH_3 .

C. CO_2 .

D. PH_3 .

24. Which phosphorus compound is used as a chlorinating agent and as a test for hydroxyl groups in straight-chain organic compounds?

A. phosphorus (V) oxide.

B. phosphorus (III) chloride.

C. phosphorus (V) chloride.

D. trioxophosphates (III).

25. Silicon is found in the combined form as _____

(i) Silicon (IV) oxide.

(ii) Trioxosilicates (IV).

(iii) Silicon tetrachloride.

A. (ii) only.

B. (i), (ii) and (iii).

C. (iii) only.

D. (i) and (ii).

26. When white phosphorus reacts with dry chlorine in an inert atmosphere of dry carbon (IV) oxide, _____ is produced.

A. P_4O_6

B. PCl_5

C. PCl_3

D. P_4O_{10}

27. Phosphorus (V) chloride is prepared by the _____

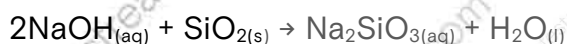
A. action of dry chlorine on phosphorus (III) oxide.

- B. action of dry chlorine on phosphorus (III) chloride.
- C. action of dry chlorine on phosphorus (V) oxide.
- D. action of dry chlorine on phosphorus.

28. Less pure crystalline silica is found in _____

- A. quartz.
- B. tridymite.
- C. jasper.
- D. cristobalite.

29. From the equation of reaction given below;



silicon (IV) oxide is acting as a _____

- A. reducing agent.
- B. oxidizing agent.
- C. acidic oxide.
- D. drying agent.

30. Crystalline silicon is manufactured by _____

- A. heating coke and limited sand in an electric furnace.
- B. heating coal and excess sand in an electric furnace.
- C. heating coke and excess sand in an electric furnace.
- D. heating coal and excess sand in a furnace.

31. _____ is used in making enamels, matches and glazes for pottery.

- A. Phosphorus (III) chloride
- B. Trioxophosphate (III) acid and its salts
- C. Phosphorus (V) oxide
- D. Tetraoxophosphates (V) acid and its salts

32. The solvent suitable for sulphur and phosphorus is _____

- A. benzene.
- B. carbon tetrachloride.
- C. carbon (IV) sulphide.
- D. methyl benzene.

33. The purest form of silica is _____

- A. flint.
- B. opal.
- C. quartz.
- D. ZnSiO_3 .

34. Which allotrope of phosphorus is insoluble in water and most common solvents?

- A. White.
- B. Black.
- C. Red.
- D. Green.

35. The ignition temperature of white phosphorus is _____

- A. 100°C .
- B. 250°C .
- C. 35°C .
- D. 44°C .

36. The allotrope of phosphorus with a macro molecule structure is _____

- A. red.
- B. green.

C. black.

D. white.

37. Metallic trioxosilicates are found in the following except _____

A. slate.

B. granite.

C. basalt.

D. clay.

38. Though carbon and silicon appear in the same group of the periodic table, they differ extensively from each other because _____

A. silicon is a metalloid but carbon is not.

B. carbon exhibits allotropy but silicon does not.

C. silicon is volatile but carbon is not.

D. silicon is more abundant in nature than carbon.

39. When phosphorus reacts with copper (II) tetraoxosulphate (VI), it reduces to _____

A. copper (I) oxide.

B. copper.

C. copper (II) oxide.

D. copper (IV) oxide.

40. Flint glass contains _____

A. trioxosilicates (IV) of copper.

B. trioxosilicates (IV) of zinc.

C. trioxosilicates (IV) of lead.

D. trioxosilicates (IV) of iron.

41. Phosphorus used in making safety matches is red phosphorus because _____

- A. it is stable when mixed with oxidizing agents.
- B. it has low ignition temperature.
- C. it has low specific heat capacity.
- D. it has high ignition temperature.

42. What is the oxidation state of phosphorus in the compound P_4O_6 ?

- A. -3.
- B. +3.
- C. +5.
- D. +2.

43. Sodium trioxosilicates (IV) is made by heating _____

- A. one part by mass of silicon (IV) oxide with one part by mass of sodium trioxocarbonate (IV).
- B. two parts by mass of silicon (IV) oxide with one part by mass of sodium trioxocarbonate (IV).
- C. two parts by mass of silicon (IV) oxide with two parts by mass of sodium trioxocarbonate (IV).
- D. one part by mass of silicon (IV) oxide with two parts by mass of sodium trioxocarbonate (IV).

44. Solvent for silicon (IV) oxide is _____

- A. HF.
- B. CCl_4 .
- C. CS_2 .
- D. Benzene.

45. The following are drying agents except _____

- A. P_4O_{10} .
- B. $CaCl_2$.
- C. silica gel.
- D. NaOH pellets.

46. Which of the following are physical properties of silicon (IV) oxide?

- (i) It exist as a colourless crystalline solid when pure.
- (ii) Because of its structure, it is non-volatile and hard.
- (iii) It has a high melting poin.t
- (iv) When cooled forms fused silica which makes it very heat resistant and acid resistant.

- A. (i), (ii) and (iv).
- B. (i), (iii) and (iv).
- C. (i), (ii) and (iii).
- D. (i), (ii), (iii) and (iv).

47. Which of the following are methods of preparing phosphine?

- (i) Reaction of white phosphorus and hot sodium hydroxide.
- (ii) Reaction of water on calcium phosphide.
- (iii) Reaction with red phosphorus and hot sodium hydroxide.
- (iv) Reaction of an acid on calcium phosphide.

- A. (i), (ii) and (iv).
- B. (ii), (iii) and (iv).
- C. (iii) only.
- D. (i), (ii), (iii) and (iv).

48. Phosphorus is abundantly found in rock except _____
- A. rock phosphate
 - B. rock phosphorite.
 - C. rock apatite.
 - D. rock jasper.
49. When hot sodium hydroxide reacts with red phosphorus _____
- A. no reaction takes place.
 - B. phosphorus (III) oxide is formed.
 - C. phosphorus (III) chloride is formed.
 - D. phosphine is formed.
50. Silicon (Si) may be prepared in the laboratory from the following equations except _____
- A. pure dry sand + magnesium.
 - B. silicon (IV) oxide + coke.
 - C. silicon (IV) chloride + zinc.
 - D. silicon (III) chloride + hydrogen.
51. Silicon (IV) oxide is insoluble in the following substance except _____
- A. hexafluorosilicates (IV).
 - B. water.
 - C. H_2SO_4 .
 - D. HNO_3 .

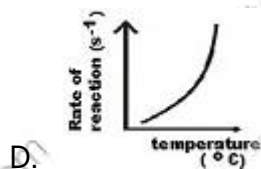
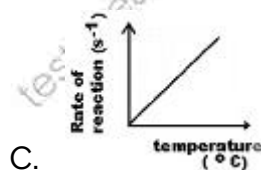
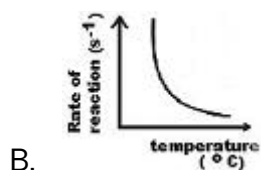
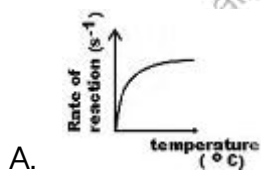
52. White phosphorus is soluble in the following solvents except _____

- A. carbon (IV) sulphide.
- B. benzene.
- C. organic solvents.
- D. water.

TOPIC: RATE OF REACTIONS

DIRECTION: Choose the correct options from the lettered options.

1. Which of the diagram illustrates an increase in both the rate of reaction and temperature?



The correct answer is option [D]

2. Reaction occurs when the colliding reactant particles _____

- A. have energy less than the energy barrier.
- B. have energy equal or greater than the energy barrier.
- C. have energy less than effective collision.
- D. have energy greater than that of the products.

3. Which of the following factors does not affect the rate of a chemical reaction between non-gaseous reactants?

- A. Concentration of reactants.
- B. Pressure.
- C. Temperature.
- D. Presence of a catalyst.

4. What do we do to increase the surface area of the reactants?

- A. breaking them into chips.
- B. subjecting the reactants to high pressure.
- C. altering the direction of the reaction.
- D. using reactants of different densities.

5. Two identical samples of calcium trioxocarbonate (IV) are placed in two beakers. 100cm³ of 1.0M hydrochloric acid are added to one, and 100cm³ of 5.0M hydrochloric acid are added to the other. All other conditions are the same.

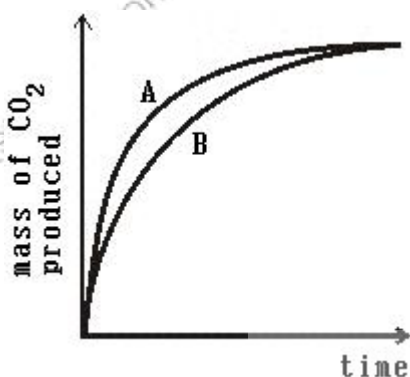
Which of these is the same for the two cases?

- A. Molarity of chloride ions at any instant.
- B. Initial reaction rate.
- C. Time taken for the reaction to complete.
- D. Mass lost from the beakers on completion of reaction.

6. The minimum amount of energy required for effective collisions between reacting particles is known as _____

- A. activation energy.
- B. bond energy.
- C. kinetic energy.
- D. potential energy.

7. The diagram drawn is an illustration to study the _____



- A. effect of pressure on reaction rate.
- B. effect of surface area of reactant on reaction rate.
- C. effect of catalyst on reaction rate.
- D. effect of concentration of reactant on reaction rate.

8. The following are types of crystalline solids except _____ solids.

- A. covalent
- B. ionic
- C. molecular
- D. electronic

9. The minimum energy that the reactants must have before they can change to products is known as _____

- A. chemical kinetics.
- B. kinetic energy.
- C. activation energy.
- D. reaction energy.

10. Rates of chemical reactions are dependent on the _____

- (i) concentration of reactants.
- (ii) temperature of reactants.

(iii) presence or absence of a catalyst.

(iv) surface area of reactants.

A. (i) and (iii) only.

B. (i), (ii) and (iii) only.

C. (i) and (iv) only.

D. (i), (ii), (iii) and (iv).

11. The equation given below;

$$k = A e^{\frac{-E_a}{RT}}$$

is called _____

A. Newton's equation.

B. Arrhenius equation.

C. Arrhenius factor.

D. Newman's equation.

12. The factors that affect the rate of chemical reactions include _____

(I) concentration.

(II) temperature.

(III) presence of a catalyst.

(IV) collision frequency of particles.

A. I & II.

B. III & IV.

C. I, II & III.

D. I, II, III & IV.

13. These are factors affecting chemical reaction except _____

A. surface area.

B. catalyst.

- C. nature of reactants.
- D. activation energy.

14. Which of the following does not affect the rate of a chemical reaction?

- A. Concentration of the reactants
- B. Addition or presence of a catalyst
- C. Size of reacting particles
- D. The enthalpy change of the reaction

15. The rate of chemical reaction of solids are not affected by _____

- A. catalyst.
- B. pressure.
- C. particle size.
- D. temperature.

16. When there is an increase in concentration of the reactants there will be a corresponding _____

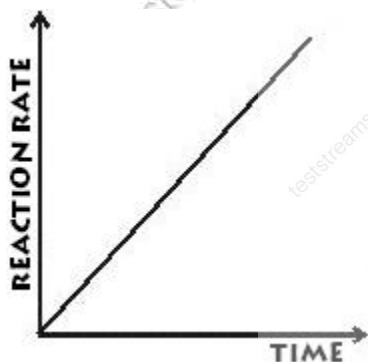
- A. decrease in the effective collisions of the reactants.
- B. no effective collisions of the reactants.
- C. increase in the effective collisions of the reactants.
- D. none of the above.

17. Which of the following statements are correct about equilibrium?

- (I) Chemical equilibrium is attained when the rates of forward and backward reactions are equal.
- (II) Changes in concentrations of reactants will alter equilibrium concentrations.
- (III) the rate of formation of the products decreases with time.
- (IV) all reactants have been used up.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

18. The reaction rate diagram signifies _____



- A. concentration against time.
- B. time against concentration.
- C. concentration against inverse of time.
- D. all of the above.

19. The following methods are used to determine and measure the reaction rates except _____

- A. volume of a gaseous product.
- B. changes in intensity of colour.
- C. changes in pH
- D. increases in the mass of the reaction system as a result of addition of gaseous products.

20. What can prevent reactions from taking place?

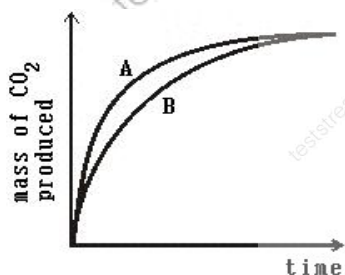
- A. Collision of particles and the energy of the particles is zero to the activation energy.

B. There is no collision of the particles and the energy of the particles is greater than the activation energy.

C. The energy of the particles being less than the activation energy and there is no collision of the particles.

D. The energy of the particles being greater than or equal to the activation energy and there is collision of the particles.

21. The diagram drawn, the part labelled B is _____



A. powdered marble.

B. dust marble.

C. marble chips.

D. all of the above.

22. Temperature affects rate of reaction except _____

A. it increases the frequency of collision.

B. it burns the reactants with reckless heating.

C. it increases the kinetic energies of the reactant.

D. the number of effective collisions of the reactants.

23. When at equilibrium, which of the reactions below will shift to the right if the pressure is kept constant?

A. $2\text{NO}_{(g)} \rightarrow \text{N}_{2(g)} + \text{O}_{2(g)}$

B. $2\text{SO}_{3(g)} \rightarrow 2\text{SO}_{2(g)} + \text{O}_{2(g)}$

C. $2\text{CO}_{2(g)} \rightarrow 2\text{CO}_{(g)} + \text{O}_{2(g)}$

D. $2\text{H}_{2(g)} \rightarrow 2\text{H}_2\text{O}_{(g)}$

24. In the reaction given below;



Why was finely divided iron used as a catalyst?

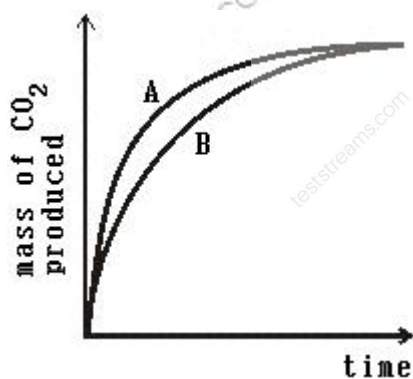
- A. To increase the forward reaction.
- B. To reduce the energy barrier.
- C. To increase the surface area of reactants.
- D. None of the above.

25. The rate curve is used to determine _____

- (i) average rate of reaction.
- (ii) rate at a particular instant during the reaction.
- (iii) the loss in the mass of the reaction system.

- A. (i) only.
- B. (i) and (ii) only.
- C. (i), (ii) and (iii).
- D. (iii) only.

26. The diagram drawn, the part labelled A is _____



- A. marble chips.
- B. powdered marble.
- C. granule marble.
- D. none of the above.

27. The following are factors that affect rates of reaction except _____

- A. Activation energy.
- B. Surface area of reactants.
- C. Presence of catalyst.
- D. Concentration of reactants.

28. Catalysts _____

- A. increase the equilibrium constants of reactants.
- B. bring about the energy barrier of reaction.
- C. lower the activation energy of reaction.
- D. surmount the energy barrier of reaction.

29. Which of the following is not true of a catalyst?

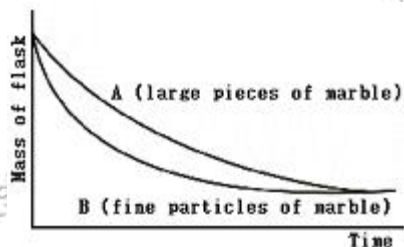
- A. A catalyst will lower the activation energy for a reaction.
- B. A catalyst is used up when it catalyzes a reaction.
- C. A catalyst will speed up the rate of a reaction.
- D. A catalyst is not used up when it catalyzes a reaction..

30. The unit of rate of chemical reaction is _____

- A. $\text{mol dm}^{-3} \text{s}^{-1}$.
- B. $\text{mol}^{-1} \text{s}^{-1}$.
- C. mol^{-1} .
- D. s mol^{-1} .

31. Two flasks, A and B, contain equal weights of coarse and fine marble respectively. 40 cm^3 of 2M hydrochloric acid is added to each flask and the flasks are weighed every minute. The different weights are plotted against the time from the start of the experiment. The results are shown in the diagram drawn.

The experiments illustrates the effect of _____



- A. surface area on the reaction rate.
- B. temperature on the reaction rate.
- C. catalysis on the reaction rate.
- D. concentration on the reaction rate.

32. What factor is responsible for the following reactions?

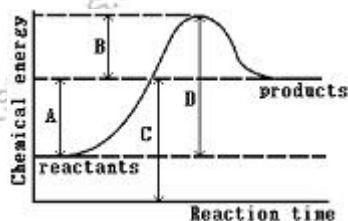
- (i) Decomposition of H_2O_2 .
- (ii) Reaction between methane and chlorine.
- (iii) Conversion of silver halides to grey metallic silver.

- A. Decomposition.
- B. Light.
- C. Concentrators.
- D. Catalyst.

33. The minimum or critical amount of energy required before a chemical reaction could occur is called _____

- A. reaction energy.
- B. effective collision.
- C. activation energy.
- D. activated complex.

34. The graph drawn gives the energy profile of a reacting system. Which of the energies represents the activation energy of the reaction?



- A. A.
- B. B.
- C. C.
- D. D.

35. "The rate of a reaction is proportional to the number of effective collisions occurring per second between the reactants."

This statement is associated with the _____

- A. kinetic theory.
- B. atomic theory.
- C. collision theory.
- D. gas laws.

36. If 2 g of zinc granules was reacted with excess dilute HCl to evolve hydrogen gas which came to completion after 5 minutes. Calculate the rate of the chemical reaction in g hr⁻¹.

- A. 48 g hr⁻¹.
- B. 12 g hr⁻¹.
- C. 24 g hr⁻¹.
- D. 240 g hr⁻¹.

37. Rate of chemical reaction depends on the following factors except _____

- A. rate at which gas is evolved.

- B. rate at which products are formed.
- C. rate at which the colour of reactions change.
- D. rate at which the reactants diminish.

38. What is the rate of reaction?

- A. It is the change in concentration of reactant or product per unit time.
- B. It is the change in concentration of reactant or product.
- C. It is the number of moles of reactants converted or product formed.
- D. It is the product of time and the number moles of reactant converted or product formed.

39. When a diluted solution of "20-volume" hydrogen peroxide solution was heated, the total volume of oxygen collected was 105 cm³ in just 35 minutes. What was the rate of formation of oxygen?

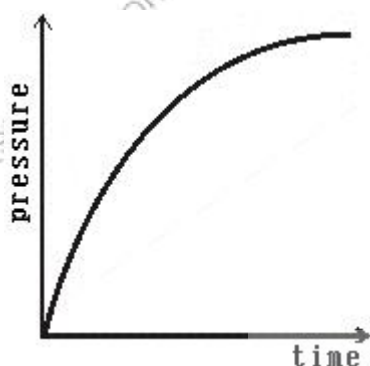
- A. 3 cm⁻³ min⁻².
- B. 3 cm³ min⁻¹.
- C. 60 cm⁻³ min⁻².
- D. 60cm³ min⁻¹.

40. Which of the following statement(s) is/are correct about catalysts?

- (I) They alter the rate of chemical reactions.
- (II) They are generally specific in action.
- (III) They remain unchanged chemically at the end of the reaction.
- (IV) They starts the reaction.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

41. The diagram drawn is a _____



- A. reaction rate curve.
- B. equilibrium curve.
- C. chemical kinetics curve.
- D. pH curve.

42. Which of the following statements in the options is incorrect?

Rates of chemical reaction can be altered by the _____

- A. amount of catalyst used.
- B. concentration of the reactants.
- C. volume of reactants in the solution.
- D. surface area of solid reactants.

43. For most irreversible reactions, _____

- A. the reaction rate increases with time.
- B. the reaction rate decreases with time.
- C. the rate stabilizes with time.
- D. the rate produces a curve with time.

44. Equilibrium is said to be attained in a reversible reaction when _____.

- A. all the reactants have been used up
- B. all the products have been used up
- C. there is no further change in temperature
- D. the rates of the forward and backward reactions are equal

TOPIC: SULPHUR AND ITS COMPOUNDS**DIRECTION: Choose the correct options from the lettered options.**

1. What is the name of product Y in the following reaction?



- A. Copper (II) hydroxide.
- B. Hydrogen sulphide.
- C. Sulphur (VI) oxide.
- D. Sulphur (IV) oxide.

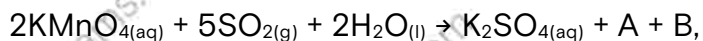
2. Powdered sulphur is heated to its boiling point and then poured into cold water. The product is an elastic ribbon-like substance, which is insoluble in carbon disulphide and called _____

- A. rhombic sulphur.
- B. flowers of sulphur.
- C. plastic sulphur.
- D. monoclinic sulphur.

3. The reaction of concentrated tetraoxosulphate (VI) acid with metals produces _____

- A. metallic tetraoxosulphate (VI), water and hydrogen.
- B. metallic tetraoxosulphate (VI) and hydrogen.
- C. metallic tetraoxosulphate (VI), water and sulphur (IV) oxide.
- D. metallic tetraoxosulphate (VI) and sulphur (IV) oxide.

4. From the equation of reaction given below,



Sulphur (IV) oxide is acting as a _____

- A. drying agent.
- B. reducing agent.
- C. oxidizing agent.
- D. dehydrating agent.

5. Which of the following physical properties of hydrogen sulphide are correct?

- (i) It is moderately soluble in water.
- (ii) It is very poisonous.
- (iii) It burns with a pale blue flame.
- (iv) It is less dense than air.

- A. (i), (ii), and (iv).
- B. (i), (ii), (iii) and (iv).
- C. (i), (ii) and (iii).
- D. (ii), (iii) and (iv).

6. Concentrated tetraoxosulphate (VI) acid is a dehydrating agent when it _____

- A. removes the elements of hydrogen and oxygen in the form of water from compounds.
- B. donates electrons to oxidizing agents.
- C. accepts electrons from reducing agents.
- D. removes the elements of oxygen from compounds.

7. To test for trioxosulphates (IV) _____ is used, with a dilute acid and _____ is evolved/deposited.

- A. barium trioxonitrate and sulphur (IV) oxide
- B. barium trioxocarbonate and sulphur (IV) oxide
- C. barium trioxonitrate and sulphur
- D. barium trioxonitrate and hydrogen sulphide

8. Excess sulphur reacts with hot concentrated NaOH solution to form _____
- A. sodium sulphide + sodium trioxosulphate (IV).
 - B. sodium sulphide + sodium tetraoxosulphate (VI).
 - C. sodium polysulphide + sodium trioxothiosulphate (IV).
 - D. sodium polysulphide + sodium tetraoxosulphate (VI).
9. Extraction of sulphur from the earth's crust is by one of these processes.
- A. Solvay process.
 - B. Contact process.
 - C. Frasch process.
 - D. Kiln process.
10. To test for tetraoxosulphates (VI) _____ is used.
- A. acidified barium chloride
 - B. acidified barium trioxocarbonate
 - C. acidified barium hydroxide
 - D. acidified barium trioxonitrate
11. Both hydrogen sulphide and sulphur (IV) oxide decolorize acidified potassium tetraoxomanganate (VII), but hydrogen sulphide produces _____
- A. tetraoxosulphate (VI) acid.
 - B. sulphur (IV) oxide.
 - C. a precipitate of sulphur.
 - D. hydrogen gas.
12. The property of sulphur used in its extraction by the Frasch process is its _____
- A. low melting point.
 - B. unstable nature.

C. allotropic nature.

D. non-metallic nature.

13. Sulphur (IV) oxide is used for the following except _____

A. germicide and fumigant.

B. refrigerant.

C. preserving liquids like orange juice.

D. used for restoring ozone layer.

14. Sulphur (IV) oxide bleaches by _____

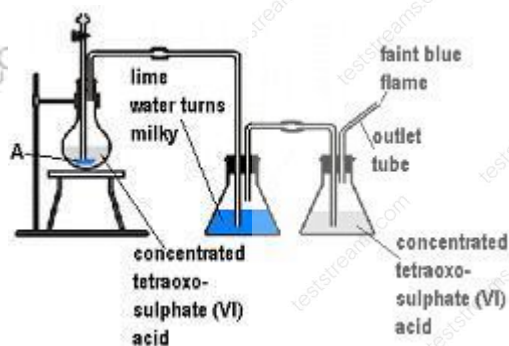
A. oxidation.

B. reduction.

C. decomposition.

D. carboxylation.

15. The diagram drawn is an illustration of an experiment used to _____



A. prepare metallic tetraoxosulphates.

B. study the dehydrating action of concentrated tetraoxosulphate (VI) acid on ethanedioic acid.

C. study the reducing action of concentrated tetraoxosulphate (VI) acid on compounds.

D. study the oxidizing action of concentrated tetraoxosulphate (VI) acid on compounds.

16. The following are allotropes of sulphur except _____

- A. white.
- B. rhombic.
- C. prismatic.
- D. amorphous.

17. Metallic sulphides which do not react with hydrochloric acid are fused with _____

- A. sodium trioxosulphate (IV).
- B. sodium tetraoxosulphate (VI).
- C. sodium trioxocarbonate (IV).
- D. sodium hydroxide.

18. Metallic sulphide is prepared by the following except _____

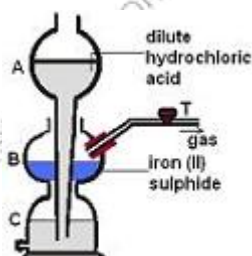
- A. neutralization.
- B. direct heating.
- C. direct combination.
- D. precipitation.

19. From the equation of reaction given below;
 $2\text{KMnO}_{4(aq)} + 5\text{SO}_{2(g)} + 2\text{H}_2\text{O}_{(l)} \rightarrow \text{K}_2\text{SO}_{4(aq)} + \text{A} + \text{B}$,

What is the product A?

- A. $2\text{H}_2\text{SO}_{4(aq)}$.
- B. $\text{MnSO}_{4(aq)}$.
- C. $2\text{MnSO}_{4(aq)}$.
- D. $\text{H}_2\text{SO}_{4(aq)}$.

20. The diagram drawn is used to produce _____



- A. hydrogen sulphide.
- B. carbon (IV) oxide.
- C. sulphur.
- D. carbon (II) oxide.

21. The addition of concentrated hydrochloric acid to sodium trioxosulphate (IV) is to prepare _____

- A. sulphur (IV) oxide.
- B. sulphur (VI) oxide.
- C. trioxosulphate (IV) acid.
- D. tetraoxosulphate (VI) acid.

22. Sulphur reacts with many metals when heated in the absence of air, which of the options does sulphur react without heating?

- A. Fe.
- B. Zn.
- C. Na.
- D. Au.

23. Which of the following is a physical property of trioxosulphate (IV) acid?

- (i) Colourless and unstable.
- (ii) It smells strongly of sulphur (IV) oxide.
- (iii) It turns red litmus blue.

- A. (i) only.
- B. (i), (ii) and (iii).
- C. (i) and (ii).
- D. (ii) and (iii).

24. Which allotrope of sulphur is stable at low temperature?

- A. Rhombic.
- B. Prismatic.
- C. Amorphous.
- D. Monoclinic

25. To test for sulphur (IV) oxide, the reagents used is _____

- A. potassium heptaochromate (VI) or sodium tetraoxomanganate (VII).
- B. acidified potassium heptaochromate (VI) or potassium tetraoxosulphate (VI).
- C. acidified potassium heptaochromate (VI) or potassium tetraoxomanganate (VI).
- D. acidified potassium heptaochromate (VI) or potassium tetraoxomanganate (VI).

26. All sulphides are black except _____

- A. PbS.
- B. ZnS.
- C. HgS.
- D. FeS.

27. Which of the following are uses of sulphur?

- (i) For the manufacture of sulphuric acid.
- (ii) For preventing growth of fungi.
- (iii) For making calcium hydrogen sulphide used in bleaching pulp.
- (iv) For vulcanizing rubber.

(v) For the manufacture of fireworks.

- A. (i), (ii) and (iii) only.
- B. (i), (iii), and (iv) only.
- C. (i), (ii), (iv), and (v) only.
- D. (i), (ii), (iii), (iv), and (v).

28. Iron (II) tetraoxosulphate decomposes to produce _____

- A. metallic oxides.
- B. metallic oxides and sulphur (IV) oxide.
- C. metallic oxides, sulphur (IV) oxides and sulphur (VI) oxides.
- D. metallic oxides and sulphur (VI) oxide.

29. Which of the following option is used to prepare metallic trioxosulphates (VI)?

- A. Direct combination.
- B. Direct heating.
- C. Precipitation.
- D. Action with air.

30. The reaction between sodium trioxosulphate (IV) tetraoxosulphate (VI) acid produces _____

- A. sulphur (VI) oxide.
- B. hydrogen sulphide.
- C. sulphur.
- D. sulphur (IV) oxide.

31. Sulphur reacts with soft rubber to harden it by _____

- A. direct linkage.
- B. polymerization.

C. cross linkage.

D. smoking.

32. Sulphur reacts with metals and non-metals to form _____

A. tetraoxosulphate (VI).

B. trioxosulphates (IV).

C. sulphides.

D. trioxothiosulphate (VI).

33. The melting point of sulphur is _____

A. 170°C.

B. 200°C.

C. 98°C.

D. 115°C.

34. Which of the allotropes of sulphur has amber colour with needle shapes?

A. Rhombic sulphur.

B. Plastic sulphur.

C. Monoclinic sulphur.

D. Flower of sulphur.

35. What catalyst is used in the preparation of sulphur (VI) oxide?

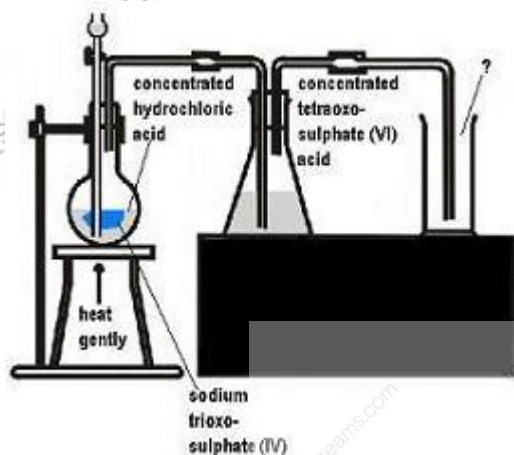
A. phosphorus (V) oxide.

B. platinized asbestos.

C. vanadium (V) oxide.

D. manganese (IV) oxide.

36. The diagram drawn is an illustration for the preparation of _____



- A. sulphur (VI) oxide.
- B. sulphur.
- C. sulphur (IV) oxide.
- D. hydrogen sulphide.

37. What catalyst is used when hydrogen sulphide is oxidized to sulphur?

- A. Aluminium hydroxide.
- B. Aluminium trioxocarbonate (IV).
- C. Aluminium hydride.
- D. Aluminium oxide.

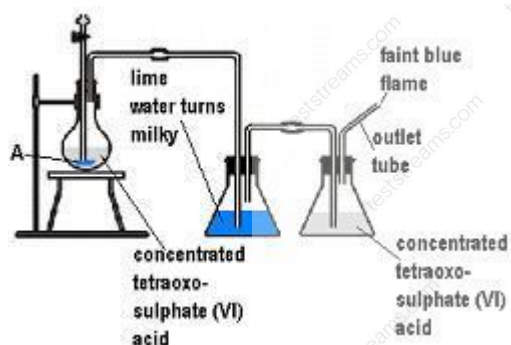
38. The feature developed when sulphur is heated gradually and in limited supply of air at 200°C is _____

- A. a brown vapour.
- B. a floral pattern.
- C. highly viscous.
- D. an amber-coloured liquid.

39. Which of these ionizes slightly in water to form a dibasic acid?

- A. Ag_2S .
- B. $\text{K}_2\text{Cr}_2\text{O}_7$.
- C. FeCl_3 .
- D. H_2S .

40. From the diagram drawn the part labelled A is _____

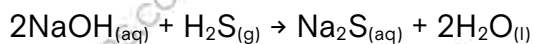


- A. ethanol.
- B. ethanal.
- C. ethanedioic acid.
- D. ethene.

41. To test for hydrogen sulphide _____ is used.

- A. iron (III) chloride
- B. potassium heptaoxochromate (VI)
- C. potassium tetraoxomanganate (VII)
- D. lead (II) trioxonitrate (V)

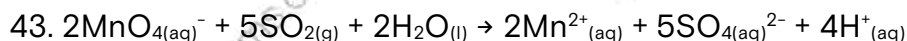
42. From the reaction given below,



hydrogen sulphide is acting as _____

- A. base.

- B. amphoteric compound.
- C. acid.
- D. salt.



The equation given above can be balanced by _____

- A. adding 2 electrons to the product.
- B. adding 2 electrons to the reactant.
- C. removing 2 electrons from the product.
- D. removing 2 electrons from the reactant.

44. Yellow paints are prepared (in the presence of Fe^{3+}) using _____

- A. SbS_3 .
- B. MnS .
- C. ZnS .
- D. SnS_2 .

45. Which of the following properties of sulphur are correct?

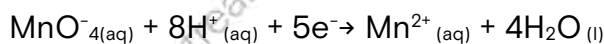
- (i) Sulphur exist in one form, crystalline.
- (ii) It is soluble in water but soluble in carbon (IV) sulphide and methyl benzene (toluene).
- (iii) It has a melting point of 115°C and a boiling point of 444°C .
- (iv) Density depends on allotropic form.

- A. (i), (ii), (iii) and (iv).
- B. (i), (ii) and (iii).
- C. (ii), (iii) and (iv).
- D. (i), (iii) and (iv).

TOPIC: TYPES OF REACTION. OXIDATION AND REDUCTION

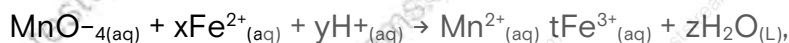
DIRECTION: Choose the correct options from the lettered options.

1. What is the change in oxidation number of manganese in the reaction represented by the equation given below?



- A. +3 to +2.
- B. +4 to +2.
- C. +5 to +2.
- D. +7 to +2.

2. From the balanced redox equation given below:



What are the values of x and t?

- A. 5 and 5.
- B. 5 and 8.
- C. 8 and 5.
- D. 5 and 4.

3. The most common feature of reactions at the anode is that _____

- A. electrons are consumed.
- B. oxidation is involved.
- C. ions are reduced.
- D. the electrode dissolves.

4. Which of the following is/are manufactured by electrolysis?

- (I) Calcium
- (II) Chlorine

(III) Aluminium

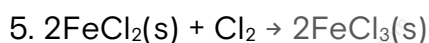
(IV) Iron

A. I & II.

B. III & IV.

C. I, II & III.

D. I, II, III & IV.



The reducing agent in the reaction above is _____.

A. FeCl_2

B. FeCl_3

C. Cl_2

D. Fe

6. Promoters in chemical reactions _____

A. improve the speed of chemical reactions.

B. improve the efficiency of a catalyst.

C. improve the stability of products.

D. improve the stability of reactants.

7. The oxidation state of sulphur in tetraoxosulphate [VI] is _____

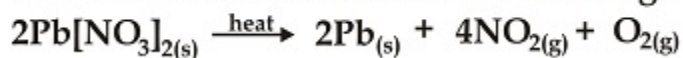
A. +5.

B. -6.

C. +6.

D. +4.

8. What can be inferred from the reaction given below?



- A. Lead [II] oxide is oxidized.
- B. NO_2 is isolated.
- C. $\text{Pb}[\text{NO}_3]_2$ is decomposed.
- D. $\text{Pb}[\text{NO}_3]_2$ is dissociated.

9. A substance which gains oxygen, loses hydrogen, or loses electrons is said to be _____

- A. oxidized.
- B. reduced.
- C. reacted.
- D. decomposed.

10. In the reaction below _____

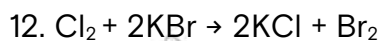


- A. $\text{Pb}(\text{NO}_3)_2$ is dissociated.
- B. Lead (II) oxide is oxidized.
- C. NO_2 is isolated.
- D. O_2 is an oxidizing agent.

11. What current in amperes will deposit 2.7g of Aluminium in 2 hours?

[Al = 27, F = 96,500 C mol⁻¹]

- A. 32 A.
- B. 8 A.
- C. 4 A.
- D. 16 A.



In the equation given above chlorine is _____

- A. an oxidizing agent.
- B. a reducing agent.
- C. an electron donor.
- D. an acid.

13. The oxidation number of chlorine is +1 in _____

- A. KClO_3 .
- B. NaClO .
- C. ZnCl_2 .
- D. HCl .

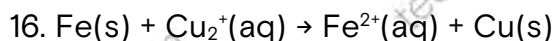
14. Which of the following statements is true?

- A. H_2O_2 is a strong electrolyte.
- B. $\text{C}_6\text{H}_{12}\text{O}_6$ is a non-electrolyte.
- C. CH_3 is a weak electrolyte.
- D. All of the above.

15. The reaction represented by the equation;



- A. double decomposition.
- B. neutralization.
- C. reversible.
- D. usually catalyzed.



Which of the following options can be inferred from the reaction above?

- A. Fe is an oxidizing agent
- B. Fe is reduced
- C. Cu^{2+} loses electrons
- D. Cu^{2+} is the oxidizing agent

17. What reactions occurs at the electrodes during the electrolysis of concentrated sodium chloride solution using carbon electrode?

- A. Oxidation takes place at the anode.
- B. Chlorine is evolved at the anode.
- C. Hydrogen is evolved at the cathode.
- D. All of the above.

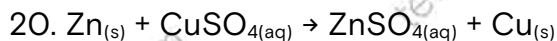
18. Which of the following statements is true of the electrochemical series?

- A. Electropositivity of metals increases down the series.
- B. Electropositivity of non-metals decreases down the series.
- C. Electronegativity of non-metals increases down the series.
- D. Electropositivity of metals decreases down the series.

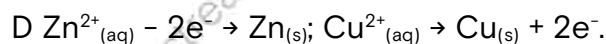
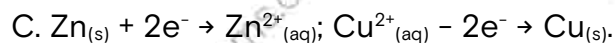
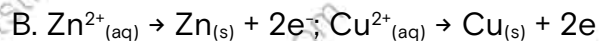
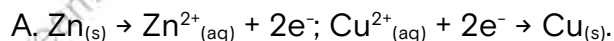
19. Which of the following statements are correct?

- (I) A primary cell cannot maintain a steady current over a long period.
- (II) Polarization is said to occur in a cell when hydrogen bubbles form on the plates.
- (III) The Daniel cell is an electrochemical cell.
- (IV) lead accumulators is used as a car battery.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.



The above half equation is _____



21. The oxidation number of the manganese atom in potassium tetraoxomanganate [VII] KMnO_4 is _____

A. +7.

B. -7.

C. +5.

D. +6.

22. Oxidation reaction may be defined as follows except _____

A. a reaction in which electron is lost.

B. a reaction in which there is an increase in the oxidation number.

C. a reaction in which oxygen is gained.

D. a reaction in which hydrogen is gained.

23. Rusting is an example of _____ reaction.

A. redox

B. combination

C. combustion

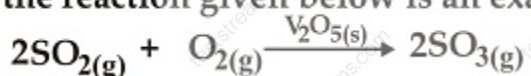
D. decomposition

24. What mass of copper would be deposited by a current of 1.0 amperes passing for 965 seconds through copper (II) tetraoxosulphate (VI) solution?

[Cu = 63.5, 1F = 96,500 C]

- A. 0.318 g.
- B. 0.635 g.
- C. 3.18 g.
- D. 6.35 g.

25. In the reaction given below is an example of _____



- A. homogeneous catalysis.
- B. heterogeneous catalysis.
- C. inert catalysis.
- D. contact catalysis.

26. The rules for determining oxidation numbers include the following option as stated except _____

- A. the oxidation number of all elements in the free state is zero.
- B. the oxidation number of a simple ion has the same size and sign as the charge of the ion.
- C. the algebraic sum of the oxidation numbers of all the elements in a compound is positive.
- D. the algebraic sum of the oxidation numbers of all the elements in a compound is zero.

27. A reducing agent is a substance _____

- A. which brings about an oxidation and it is itself reduced during a reaction.
- B. which brings about an oxidation and it is itself oxidized during a reaction.
- C. which brings about a reduction and it is itself reduced during a reaction.
- D. which brings about a reduction and it is itself oxidized during a reaction.

28. When hydrogen sulphide is burnt in oxygen to form sulphur [iv] oxide and water the oxidation number of sulphur changes from _____ to _____

- A. -2 to -2.
- B. -4 to +4.
- C. -2 to +4.
- D. -2 to -4.

29. Selective discharge of ions during electrolysis depends on the _____.

- (i) position of ions in the electrochemical series
- (ii) nature of the electrodes
- (iii) charge on the ions
- (iv) quantity of electricity passed through the electrolyte

- A. I & II
- B. III & IV
- C. I, II & III
- D. I, II, III & IV

30. Which of the following substances conducts electricity in the molten state but not in the solid state?

- A. Iron filings.
- B. Paraffin wax.
- C. Potassium chloride.
- D. Sulphur.

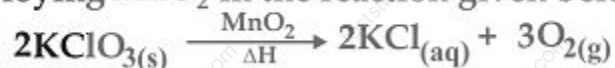
31. Which of the following is/are manufactured by the electrolysis of concentrated sodium chloride solution?

- (I) Chlorine.
- (II) Sodium hydroxide.
- (III) Hydrogen.

(IV) Sodium oxochlorate (I).

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

32. In employing MnO_2 in the reaction given below, _____



- A. MnO_2 is catalysed.
- B. KClO_3 is catalysed.
- C. the forward reaction is catalysed.
- D. the backward reaction is catalysed.

33. All electrolytic changes at a cathode must be _____

- A. reduction as ions lose electrons.
- B. oxidation as ions lose electrons.
- C. reduction as ions gain electrons.
- D. oxidation as ions gain electrons.

34. Oxidation is a reaction, which can involve _____

- (I) loss of electrons.
 - (II) Increase in oxidation number.
 - (III) gain of oxygen.
 - (IV) loss of hydrogen.
- A. I & II.
 - B. III & IV.
 - C. I, II & III.
 - D. I, II, III & IV.

35. Why is it that oxidation and reduction reactions occur together?

- A. Because they involve two opposing yet complementary processes and transfer of electrons.
- B. Because they involve transfer of atoms.
- C. Because they involve two opposing complementary processes.
- D. Because they involve two opposing yet complementary processes and transfer of atoms.

36. Which of the following does not define oxidation?

- A. Removal of electron[s].
- B. Addition of oxygen.
- C. Removal of electronegative elements.
- D. Increase of oxidation number in the positive direction.

37. All of the following except _____ affects the discharge of ions during electrolysis.

- A. position of the ions in the redox series.
- B. concentration of ions.
- C. nature of electrodes.
- D. temperature of the solution.

38. Which of the following is a property of the cathode ray?

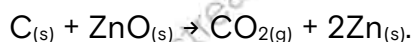
- A. They flow from the cathode to the anode.
- B. Travel in straight line and cast a shadow of an object placed in their path.
- C. Are negatively charged.
- D. All of the above.

39. In the process of silver-plating a metal M is formed, the metal M is the _____.

- A. anode and a direct current is used

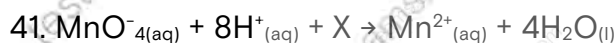
- B. cathode and an alternating current is used
- C. anode and an alternating current is used
- D. cathode and a direct current is used

40. From the equation given below,



the oxidation number of free carbon is _____

- A. -4.
- B. +4.
- C. Zero.
- D. +2.



In balancing the above redox equation, what is the value X?

- A. 10e.
- B. 2e.
- C. 5e.
- D. 4e.

42. If Fe has an oxidation number of +2, what is the value of X in the complex ion $[\text{Fe}(\text{CN})_6]^{x}$?

- A. -4.
- B. -3
- C. -2.
- D. +3.

43. Which of the following is the correct test for oxidizing agents?

[i] Action on iron [II] chloride.

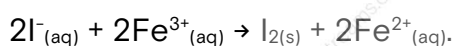
[ii] Action on acidified potassium tetraoxomanganate [VII].

[iii] Action on acidified potassium heptaoxochromate [VI].

[iv] Action on hydrogen sulphide.

- A. [i] and [ii] only.
- B. [ii] and [iv] only.
- C. [i] and [iv] only.
- D. [ii] and [iii] only.

44. From the reaction below, which ion is a reducing agent?



- A. I^-
- B. 2Fe^{3+}
- C. I_2
- D. 2Fe^{2+}

45. Carbon acts as a reducing agent in all of these reactions except _____

- A. $\text{C}_{(\text{s})} + 2\text{H}_{2(\text{g})} \rightarrow \text{CH}_{4(\text{g})}$
- B. $\text{C}_{(\text{s})} + \text{CuO}_{(\text{s})} \rightarrow \text{Cu}_{(\text{s})} + \text{CO}_{2(\text{g})}$
- C. $\text{C}_{(\text{s})} + \text{Fe}_2\text{O}_{3(\text{s})} \rightarrow 2\text{Fe}_{(\text{s})} + 3\text{CO}_{(\text{g})}$
- D. $\text{C}_{(\text{s})} + \text{CO}_{2(\text{g})} \rightarrow 2\text{CO}_{(\text{g})}$

46. Oxidation and reduction have had many definitions assigned to them at different times. Which of these is not one such definitions of oxidation?

- A. The addition of oxygen to or removal of hydrogen from a substance.
- B. Increase in concentration of positive ions.
- C. Increase in oxidation number.
- D. The process of electron loss.

47. Which of the following steps are followed in balancing atoms and charges in a redox equation?

[i] Add the appropriate numerical coefficients.

[ii] Place the correct number of H_2O , H^+ or OH^- on the appropriate side of the equation if necessary.

[iii] Add the correct number of electrons on the right and left hand side for the oxidation and reduction half-equation.

A. [i] and [iii] only.

B. [ii] and [iii] only.

C. [i], [ii] and [iii].

D. [i] only.

48. What is the oxidation number of chromium in sodium heptaoxochromate [VI]?

A. +3.

B. +6.

C. +12.

D. +2.

49. Which of the option is not the most common way of balancing redox equations?

A. Write down the oxidizing agent and the reducing agent. Deduce the product in each case.

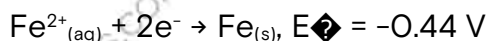
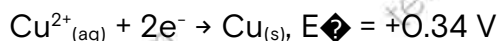
B. Write the half-equation for oxidation and reduction. Balance the atoms and charges for each equation.

C. Combine the half-equations to add the electrons and get the overall redox equation.

D. Make sure that the electron loss in the oxidation half-equation is balanced by the electron gain in the reduction half-equation.

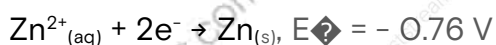
50. A feasible cell was constructed by joining the two half cells below:

What is the standard e.m.f of the cell?



- A. -0.78 V.
- B. -0.10 V.
- C. +0.10 V.
- D. +0.78 V.

51. A feasible cell was constructed by joining the two half cells below;



What is the E.m.f.?

- A. -1.1 V
- B. -0.42 V
- C. +0.42 V
- D. +1.1 V

52. Which of the following statements is the best definition of a cathode?

- A. It is the negatively charged electrode.
- B. It is the electrode at which electrons leave the electrolyte.
- C. It is the positively charged electrode.
- D. It is the electrode at which hydrogen is evolved.

53. Which of the following statements describes oxidation?

- A. Addition of hydrogen to a compound.
- B. A gain of one or more electrons.
- C. An increase in valency [oxidation state] of a metal.
- D. A decrease in the number of negatively charged ions present in the formula of a compound.

54. Which of the following statements about cathode rays is incorrect?

- A. They emerge at right angles to the cathode.
- B. They are deflected away from negative plates.
- C. They are very light.
- D. They are positively charged.

55. Oxidation number of an element is _____

- A. the ion it appears to have as determined by a set of arbitrary rules.
- B. the change it appears to have.
- C. the electrical charge it appears to have as determined by a set of arbitrary rules.
- D. none of the above.

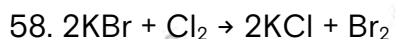
56. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

In the equation of reaction given above the oxidation number of hydrogen changes from _____ to _____

- A. +2 to +1.
- B. +4 to +1.
- C. +1 to +2.
- D. 0 to +2.

57. The oxidation number of sulphur in iron (II) sulphide is _____

- A. +2.
- B. -2.
- C. -4.
- D. +6.



In the reaction above, the role of chlorine is that of _____

- A. an acid.
- B. a base.
- C. an oxidizing agent.
- D. a reducing agent.

59. Electrolysis can be used to _____

- (I) purify metals.
- (II) extract elements.
- (III) manufacture compounds.
- (IV) electroplate metals.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

60. Which of the following methods are applicable in preventing corrosion in metals?

- (I) Storing in oil.
- (II) Allowing an inert oxide surface layer to form.
- (III) Coating with paint or tar.
- (IV) Plating with another metal.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

61. Which of the following is not true of the rusting of iron?

- A. Rusting is a reduction process
- B. Rusting of iron takes place in the presence of oxygen and moisture
- C. The rust formed is reddish brown
- D. The major constituent of rust is hydrated iron (iii) oxide

62. Which of the following statements is/are correct about electrochemical cells?

(I) Reduction occurs in one half cell while oxidation occurs in the other.

(II) The electrode in a half cell may take part in the reaction.

(III) It consists of two half cells.

(IV) Electrons flow from the anode to the cathode.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

63. Which of the following option defines oxidation in terms of oxygen and hydrogen?

- A. the addition of oxygen and addition of hydrogen in a reaction.
- B. the removal of oxygen and addition of hydrogen in a reaction.
- C. the addition of oxygen and removal of hydrogen in a reaction.
- D. the removal of oxygen and removal of hydrogen in a reaction.

64. The major difference between thermal dissociation and thermal decomposition is

- _____
- A. thermal dissociation is not reversible.
 - B. thermal decomposition is reversible.
 - C. thermal dissociation is reversible.
 - D. thermal decomposition requires moderate heat.

65. Which of the following does not affect the discharge of ions during electrolysis?

- A. Position of the ions in the redox series
- B. Concentration of the ions
- C. Nature of electrodes
- D. Temperature of the solution

ANSWERS

TOPIC: CHLORINE AND ITS COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. To test for chlorine _____ is used.

- A. damp litmus paper and bromine paper
- B. damp litmus paper and hydrogen sulphide
- C. damp litmus paper and starch-iodide paper
- D. none of the above

The correct answer is option [C]

2. The following are physical properties of chlorine except _____

- A. it cannot be liquefied.
- B. it is denser than air.
- C. it is sparingly soluble in water.
- D. it is poisonous.

The correct answer is option [A]

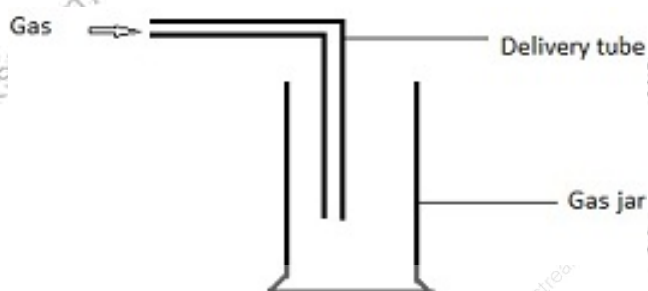
3. Which of the products of these mixtures is acidic?

- A. $\text{HCl}(\text{g})$ + chloroform.
- B. $\text{HCl}(\text{g})$ + water.
- C. $\text{HCl}(\text{g})$ + Zn.
- D. $\text{HCl}(\text{g})$ + Mg.

The correct answer is option [B]

Use the diagram to answer the question.

4. Which of the following gases can be collected by the set-up diagram illustrated?



- A. H_2 .
- B. HCl .
- C. NH_3 .
- D. N_2 .

The correct answer is option [B].

5. Why is a damp blue litmus paper placed at the mouth of a jar during the preparation of hydrogen chloride?

- A. To determine the effect of the gas on the litmus paper.
- B. For the litmus paper to absorb the gas.
- C. The litmus paper has no effect in the experiment.
- D. To determine when the jar is full.

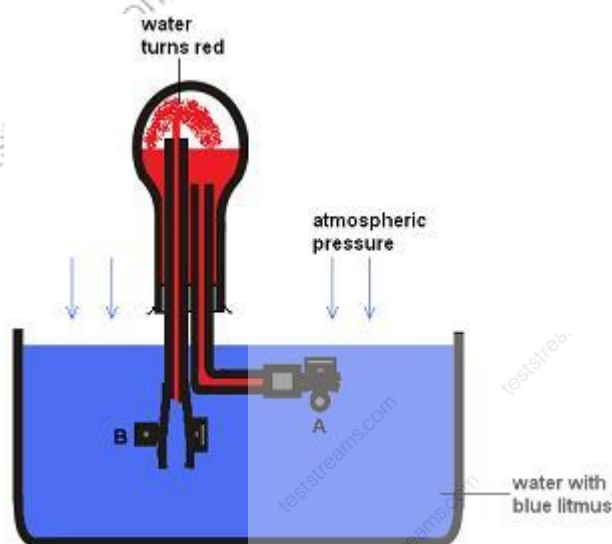
The correct answer is option [A].

6. What reagents are used to test for soluble chlorides?

- A. Ammonia.
- B. Acidified silver trioxonitrate.
- C. Acidified lead (II) trioxonitrate.
- D. Ammonia, acidified silver trioxonitrate and acidified lead (II) trioxonitrate.

The correct answer is option [D].

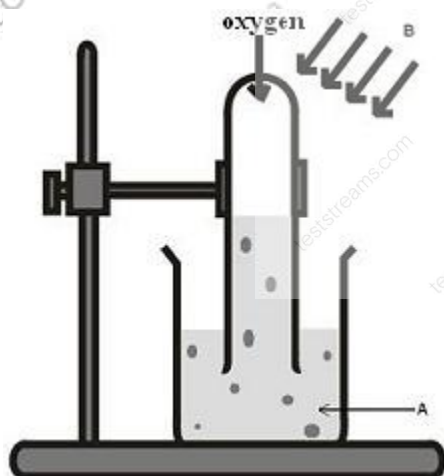
7. The diagram drawn is called _____



- A. a simple Frasch experiment
- B. a fountain experiment.
- C. a simple contact experiment.
- D. a simple solvay experiment.

The correct answer is option [B].

8. The diagram drawn is an illustration to show _____



- A. the effect of chlorine on water.
- B. the effect of phosphorus on chlorine.
- C. the effect of chlorine on hydrogen sulphide.

D. the effect of sunlight on chlorine water.

The correct answer is option [D].

9. Apart from HCl, which other common gas is used in the demonstration of fountain experiment?

A. H₂S.

B. SO₂.

C. NH₃.

D. C₂H₂.

The correct answer is option [C].

10. Chlorine is a common bleaching agent. This is not true with _____

A. wet litmus paper.

B. printer's ink.

C. wet pawpaw leaf.

D. most wet fabric dyes.

The correct answer is option [B].

11. Which option is the correct decreasing order of reactivity of halogens?

A. F₂ > Cl₂ < Br₂ > I₂.

B. F₂ > Cl₂ > I₂ > Br₂.

C. F₂ < Cl₂ < I₂.

D. F₂ > Cl₂ > Br₂ > I₂.

The correct answer is option [D].

12. Which of the following statements about chlorine and iodine at room temperature is correct?

A. Chlorine is gas and iodine is solid.

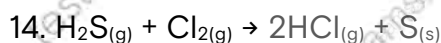
- B. Chlorine is liquid and iodine is gas.
- C. Chlorine and iodine are gases.
- D. Chlorine is solid and iodine is liquid.

The correct answer is option [A].

13. Halogens are strong _____

- A. acids.
- B. bases.
- C. electrons donors.
- D. oxidizing agents.

The correct answer is option [D].



From the equation of reaction above, chlorine is acting as an _____

- A. oxidizing agent.
- B. dehydrating agent.
- C. reducing agent.
- D. drying agent.

The correct answer is option [A].

15. Which of these options is a displacement chemical reaction?

- A. $2\text{HCl}_{(aq)} + \text{Na}_2\text{SO}_{3(aq)} \rightarrow 2\text{NaCl}_{(s)} + \text{H}_2\text{O}_{(l)} + \text{SO}_{2(g)}$.
- B. $2\text{AgOH}_{(aq)} + 2\text{HNO}_{3(aq)} \rightarrow 2\text{AgNO}_{3(aq)} + 2\text{H}_2\text{O}_{(l)}$.
- C. $\text{Cl}_{2(g)} + 2\text{HBr}_{(g)} \rightarrow 2\text{HCl}_{(g)} + \text{Br}_{2(g)}$.
- D. $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{ZnCl}_{(s)} + \text{H}_{2(g)}$

The correct answer is option [C].

16. Which of the following methods of preparing chlorine gas involves heat?

- A. $\text{MnO}_{2(s)} + \text{HCl}_{(aq)} \rightarrow \text{MnCl}_{2(aq)} + 2\text{H}_2\text{O}_{(l)} + \text{Cl}_{2(g)}$.
- B. $\text{KMnO}_{4(aq)} + \text{HCl}_{(aq)} \rightarrow 2\text{KCl}_{(aq)} + 2\text{MnCl}_{2(aq)} + 8\text{H}_2\text{O}_{(l)} + 5\text{Cl}_{2(g)}$.
- C. $\text{CaOCl}_{2(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{CaCl}_{2(aq)} + \text{H}_2\text{O}_{(l)} + \text{Cl}_{2(g)}$.
- D. Electrolysis of brine.

The correct answer is option [A].

17. Chlorine is added to a town's water supply to _____

- A. clear its colour by oxidizing discolouring impurities.
- B. kill bacteria since it is antiseptic.
- C. form calcium chloride thereby improving its mineral content.
- D. precipitate any silver or lead ions present since these are poisonous.

The correct answer is option [B].

18. The process whereby hydrochloric acid is used to remove oxides from metals before electroplating is known as _____

- A. sorting.
- B. picking.
- C. pickling.
- D. none of the above.

The correct answer is option [C].

19. The reaction between common salt and concentrated tetraoxosulphate (VI) acid liberates _____

- A. sulphur (IV) oxide.
- B. oxygen and chloride.
- C. hydrogen chloride gas.
- D. hydrogen sulphide gas.

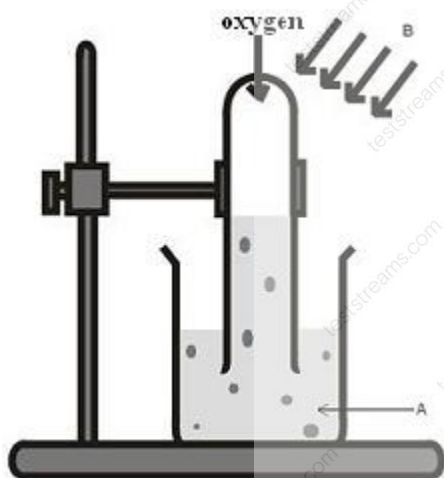
The correct answer is option [C].

20. Chlorine is not used in _____

- A. aerosol propellants.
- B. making polychloroethene.
- C. making chemicals (disinfectants).
- D. making photographic materials.

The correct answer is option [D].

21. From the diagram drawn, what is the part labelled B?



- A. sunlight.
- B. chlorine water.
- C. phosphorus.
- D. hydrogen sulphide.

The correct answer is option [A].

22. The bleaching action of chlorine in water is because _____

- A. of its reducing property.
- B. of its oxidizing power.
- C. it is a weak acid.
- D. it is an oxygen acceptor.

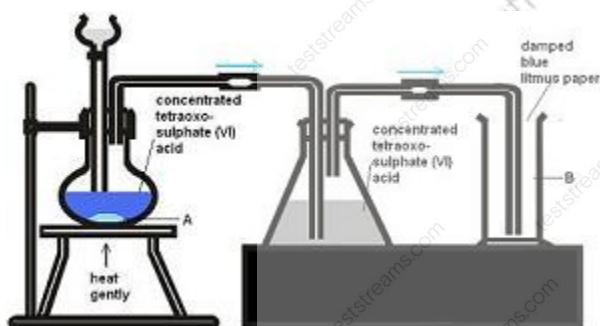
The correct answer is option [B].

23. _____ is used in etching glass and in cleaning steel.

- A. Hydrofluoric acid
- B. Hydrochloric acid
- C. Hydrogen bromide
- D. Hydrogen iodide

The correct answer is option [A]

24. The diagram drawn is an illustration of the experiment to _____



- A. prepare chlorine.
- B. prepare hydrogen bromide.
- C. prepare hydrogen chloride.
- D. study the effect of hydrogen chloride as a bleaching agent.

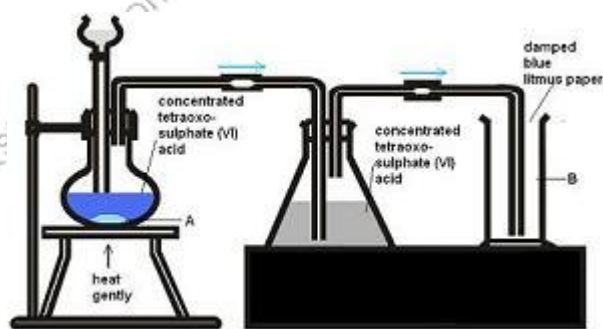
The correct answer is option [C].

25. From the diagram drawn, what is the part labelled A?

- A. hydrogen sulphide.
- B. sunlight.
- C. chlorine water.
- D. phosphorus.

The correct answer is option [C].

26. From the diagram drawn, the part labelled A is _____



- A. chlorine.
- B. sodium trioxonitrate (V).
- C. hydrogen chloride.
- D. sodium chloride.

The correct answer is option [D].

27. The product obtained when chlorine is bubbled through a freshly prepared solution of slaked lime is _____

- A. bleaching powder.
- B. chloride salt.
- C. hydrochloric acid.
- D. oxochlorate (I) acid.

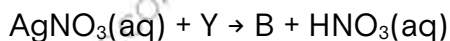
The correct answer is option [A].

28. Fluorine can be found in minerals like _____

- A. cryolite and bauxite.
- B. cryolite and fluorspar.
- C. fluorspar and apatite.
- D. phosphorite and bauxite.

The correct answer is option [B].

29. What is Y in the reaction given below?



- A. H_2CO_3 .
- B. HNO_3 .
- C. H_2SO_4 .
- D. HCl .

The correct answer is option [D].

30. Which of the following equations represents the reaction of chlorine with hot concentrated sodium hydroxide solution?

- A. $2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{NaClO}$.
- B. $4\text{NaOH} + 2\text{Cl}_2 \rightarrow 4\text{NaCl} + 2\text{H}_2\text{O} + \text{O}_2$.
- C. $6\text{NaOH} + 3\text{Cl}_2 \rightarrow 5\text{NaCl} + \text{NaClO}_3 + \text{H}_2\text{O}$.
- D. $2\text{NaOH} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{H}_2\text{O}_2$.

The correct answer is option [A].

31. Which of the following are correct physical properties of hydrogen chloride?

- (i) Pure hydrogen chloride is a colourless gas with a sharp, irritating smell.
 - (ii) It turns damp litmus paper red.
 - (iii) It is very soluble in water.
 - (iv) It forms misty fumes in moist air because it dissolves in the moisture forming hydrochloric acid.
- A. (i), (ii) and (iii).
 - B. (ii), (iii) and (iv).
 - C. (i), (ii), (iii) and (iv).
 - D. (i) and (iv).

The correct answer is option [C].

32. Which of the following reagents are used to test for hydrogen chloride?

- (i) Ammonia.
- (ii) Damp litmus paper
- (iii) Silver trioxonitrate.
- (iv) Starch-iodide paper

- A. (i) and (iii).
- B. (i), (ii) and (iii).
- C. (ii) and (iv).
- D. (i) and (ii).

The correct answer is option [A].

33. Which of the following indicates the correct increasing order of oxidising power of the halogens?

- A. $I < Br < Cl < F$.
- B. $Br < I < Cl$
- C. $Cl < F < I$
- D. $F < Cl < Br < I$.

The correct answer is option [A].

34. Which of the following is a physical property of chlorine?

- (i) Chlorine is greenish-yellow gas with an unpleasant choking smell.
- (ii) It is moderately soluble in water.
- (iii) It is denser than air.
- (iv) It is poisonous.

- A. (i), (ii), (iii) and (iv).
- B. (i) and (ii).
- C. (i), (ii) and (iii).
- D. (i), (ii) and (iv).

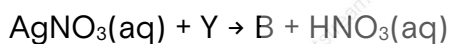
The correct answer is option [A].

35. In the laboratory preparation of chlorine, the drying agent used is _____

- A. conc. H_2SO_4 .
- B. conc. HCl .
- C. silica gel.
- D. CaCl_2 .

The correct answer is option [A].

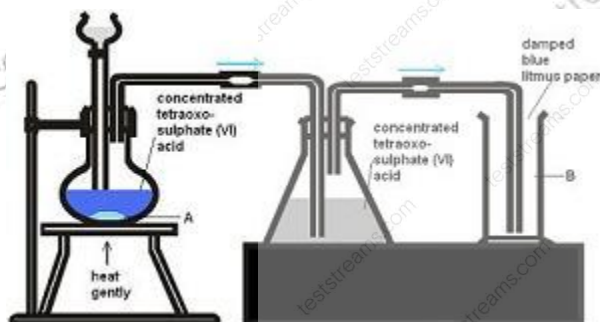
36. What is B in the reaction given below?



- A. Ag_2CO_3 .
- B. Ag_2SO_4 .
- C. AgCl
- D. AgNO_3 .

The correct answer is option [C].

37. The part labelled B from the diagram drawn is _____



- A. dry hydrogen chloride.
- B. sodium trioxonitrate (V).
- C. sodium chloride.
- D. chlorine.

The correct answer is option [A].

38. Which of the following chlorides is insoluble in water?

- A. AgCl.
- B. KCl.
- C. NH₄Cl.
- D. ZnCl₂.

The correct answer is option [A].

39. Chlorine reacts with metals to form chlorides except _____

- A. $\text{Cl}_2 + \text{Fe} \rightarrow \text{FeCl}_2$.
- B. $3\text{Cl}_2 + 2\text{Al} \rightarrow 2\text{AlCl}_3$.
- C. $2\text{Cl}_2 + \text{Sn} \rightarrow \text{SnCl}_4$.
- D. $\text{Cl}_2 + 2\text{Na} \rightarrow 2\text{NaCl}$.

The correct answer is option [A].

40. Chlorine reacts with hydrogen to form hydrogen chloride. Under what condition does this reaction occur without explosion?

- A. Under bright sunlight.
- B. Under diffused sunlight.
- C. In the presence of nickel catalyst.
- D. Under strong heating.

The correct answer is option [B].

41. Which of the following options is double decomposition used to prepare metallic chloride?

- (i) PbCl₂.
- (ii) AgCl.
- (iii) CuCl₂.
- (iv) FeCl₃.

- A. (i), (iii) and (iv).
- B. (ii) and (iii).
- C. (i) and (ii).
- D. (iv) only.

The correct answer is option [C].

42. Bromine was discovered by _____

- A. Balard.
- B. Scheele.
- C. Courtois.
- D. Cavendish.

The correct answer is option [C].

43. What gas forms white fumes when hydrogen chloride is introduced?

- A. hydrogen sulphide.
- B. ammonia.
- C. dinitrogen (I) oxide.
- D. phosphorus (II) oxide.

The correct answer is option [B].

44. From the equation given below;



give the condition of reaction.

- A. Cold dilute NaOH.
- B. Hot concentrated NaOH.
- C. Warm dilute NaOH.
- D. Hot dilute NaOH.

The correct answer is option [A].

45. When chlorine water is exposed to sunlight, the products formed are _____

- A. hydrochloric acid and oxygen.
- B. chlorine gas and oxochlorate (I) acid.
- C. oxygen and oxochlorate (I) acid.
- D. hydrogen and oxygen.

The correct answer is option [A].

46. One of these equations stands for the manufacture of hydrogen chloride.

- A. $2\text{NaCl(s)} + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{HCl(g)}$.
- B. $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl(g)}$.
- C. $\text{NaCl(aq)} + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{NaHSO}_4(\text{aq}) + \text{HCl}$
- D. $\text{NaCl(s)} + \text{NaHSO}_4(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + \text{HCl(g)}$

The correct answer is option [B].

47. Which metal is attacked by chlorine but not by dilute hydrochloric acid?

- A. Hg.
- B. Ca.
- C. Mg.
- D. Ag.

The correct answer is option [A].

48. Which of these is correct?

- A. $\text{Cl}_2 + 2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{Cl}^-$.
- B. $\text{Br}_2 + \text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{Br}^-$.
- C. $\text{I}_2 + 2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{I}^-$.
- D. $\text{Cl}_2 + 2\text{F}^- \rightarrow \text{F}_2 + 2\text{Cl}^-$.

The correct answer is option [A].

49. Fluorine is prepared by _____

- A. reaction of sodium fluoride and concentrated hydrogen trioxonitrate.
- B. contact process.
- C. electrolysis.
- D. none of the above.

The correct answer is option [C].

50. Which of the following are catalysts used in the preparation of chlorine?

- (i) Manganese (IV) oxide.
- (ii) Potassium tetraoxomanganate (VII).
- (iii) Lead (IV) chloride.

- A. (i) and (ii).
- B. (iii) only.
- C. (ii) only.
- D. (i) only.

The correct answer is option [B].

TOPIC: ELECTRODE POTENTIALS. ELECTROCHEMICAL SERIES. ELECTROLYSIS

DIRECTION: Choose the correct options from the lettered options.

1. An electrolyte conducts electricity only when _____

[i] molten.

[ii] in solution.

[iii] solid.

A. [i] only.

B. [ii] only.

C. [i] and [ii] only.

D. [i], [ii] and [iii] only.

The correct answer is option [C].

2. The law that states, the mass of an element discharged during an electrolysis is directly proportional to the quantity of electricity [Q] passing through it is _____

A. Faraday's first law of electrolysis.

B. Faraday's second law of electrolysis.

C. Faraday's third law of electrolysis.

D. Faraday's zeroth law of electrolysis.

The correct answer is option [A].

3. 0.05 Faraday of electricity is passed through acidulated water using platinum electrodes. What volume of each gas is evolved?

A. 0.56 dm³ of H₂ and 0.28 dm³ of O₂.

B. 1.12 dm³ of H₂ and 0.56 dm³ of O₂.

C. 0.224 dm³ of H₂ and 0.112 dm³ of O₂.

D. 2.24 dm³ of H₂ and 4.48 dm³ of O₂.

The correct answer is option [A]. Solution: First write one of the redox equation [i.e. for hydrogen]: $2H^+ + 2e^- \rightarrow H_2$; 1 mole of hydrogen will be produced by 2F of electricity? mole of hydrogen will be produced by 0.05F electricity $\rightarrow 0.05/2 = 0.025$ moles; 1 mole of a gas gives 22.4 dm³, then 0.025 moles gives $0.025 \times 22.4 = 0.56$ dm³ of hydrogen and oxygen is half the volume of hydrogen which is 0.28 dm³.

4. Zinc easily displaces copper from copper [II] salt solution but lead will not displace copper from copper [II] salt.

Which options best explains the statement?

- A. Zinc is placed far below copper in the activity series.
- B. Lead is placed far above copper in the activity series.
- C. Zinc is placed far above copper in the activity series.
- D. Copper is placed far above zinc in the activity series.

The correct answer is option [C].

Reason: The further apart they are in the activity series, the easier it is for displacement reactions to occur. Thus, zinc easily displaces copper from copper [II] salt solution but lead which is only two elements above copper in the activity series will not displace the latter so readily.

5. In an electrochemical cell, reduction always occur _____

- A. at the cathode.
- B. at the anode.
- C. in the electrolyte.
- D. none of the above.

The correct answer is option [A].

6. When the concentration of an electrolyte decreases, the conductivity _____

- A. decreases.
- B. increases.
- C. remains constant.

D. tends to negative value.

The correct answer is option [A].

7. In electrolytic purification process, the impure metal to be purified is used as _____

A. anode.

B. cathode.

C. electrolyte.

D. salt bridge.

The correct answer is option [B].

8. Potential difference set up when a metal is in contact with one molar solution of its ions at 25°C is called _____

A. inert standard potential.

B. standard electrode potential.

C. electrochemical cell.

D. galvanic cell.

The correct answer is option [B].

9. Given the electron volt for bromine is +1.33 and iron is +0.77, the half-cell reaction is $\text{Fe(s)}|\text{Fe}^{2+}(\text{aq})||2\text{Br}^{-}(\text{aq})|\text{Br}_2(\text{g})$, what is the electrode potential of the system?

A. +0.56V.

B. -0.56V.

C. +2.1V.

D. -2.1V.

The correct answer is option [A].

Solution: The difference in the electrode potentials is expressed as the same expressed in find the energy change of a reaction which is product - reactant; $+1.33 - [+0.77] = +0.56\text{V}$.

10. The flow of current in electrolytes is due to the movement of _____

- A. electrons.
- B. holes and electrons.
- C. ions.
- D. charges.

The correct answer is option [C].

11. Which of the following statements about the cell notation $\text{Mg}|\text{Mg}^{2+}||\text{Cu}^{2+}|\text{Cu}$ is correct?

- A. Copper is the anode.
- B. Magnesium is reduced.
- C. Magnesium is the anode.
- D. The double line represents the electrodes.

The correct answer is option [A].

12. Find the number of coulombs required to liberate 32g of copper.

[Cu = 63.5, 1F = 96,500C]

- A. 48629.9 coulombs.
- B. 92759.8 coulombs.
- C. 46829.9 coulombs.
- D. 97259.8 coulombs.

The correct answer is option [D].

Solution: Ionic equation: $\text{Cu}^{2+}_{(aq)} + 2e \rightarrow \text{Cu}_{(s)}$

2 moles of electrons deposits 1 mole of Cu

2×96500 deposits 63.5g of Cu, $\frac{2 \times 96500}{63.5}$ deposits 32g of Cu, $\frac{2 \times 96500}{63.5} \times 32 = 97259.8\text{C}$.

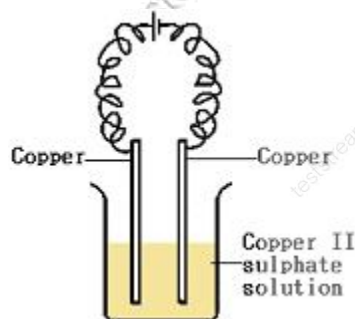
13. _____ are conductors through which an electric current enters or leaves the electrolyte.

- A. Electrolytic cells

- B. Electrolytes
- C. Electrolysis
- D. Electrodes

The correct answer is option [D].

14. Consider the cell drawn, the reaction occurring at the anode is _____



- A. $\text{SO}_4^{2-} \rightarrow \text{SO}_4 + 2\text{e}^-$.
- B. $\text{OH}^- \rightarrow \text{OH} + \text{e}^-$.
- C. $\text{Cu}_2^+ + 2\text{e}^- \rightarrow \text{Cu}$.
- D. Electrodes dissolves.

The correct answer is option [D].

15. Which of the following reaction takes place at the anode of a lead accumulator during recharging?

- A. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{Pb}_{(\text{s})}$.
- B. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{Pb}_{(\text{s})}$.
- C. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{PbSO}_{4(\text{s})}$.
- D. $\text{Pb}^{2+}_{(\text{aq})} + 2\text{e}^- \rightarrow \text{PbO}_{2(\text{s})}$.

The correct answer is option [A].

16. Electrolyte in the dry Leclanche' cell is _____

- A. anhydrous ZnSO_4 .
- B. pasty MnO_2 .

C. NH_4Cl paste.

D. muslin bag.

The correct answer is option [C].

17. What is the mass of silver in grams deposited when a current of 2A is passed through a solution of silver salt for 10 minutes?

[Ag = 108, 1 Faraday = 96500C]

A. 0.02.

B. 0.75.

C. 1.34.

D. 2.68.

The correct answer is option [C].

18. When a current of 4A is passed through a solution of gold salt for 2hrs 10mins, find the time taken for 6.0g of gold to be deposited.

[Au = 197, 1 Faraday = 96 500C]

A. 73.48 seconds.

B. 734.8 seconds.

C. 1,469.5 seconds.

D. 7.348 seconds.

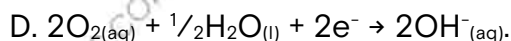
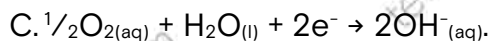
The correct answer is option [B].

Solution: $Q = It$; Ionic equation: $\text{Au}^+(\text{aq}) + e \rightarrow \text{Au}(\text{s})$; 1 mole of electron deposits 1 mole of Au; $1 \times 96\,500$ of electricity deposits 197g of Au; $96500/197$ deposits 6g $\rightarrow 96500/197 \times 6 = 2,939.09$ coulomb. Recall: $Q = It$, where $Q = 2939.09\text{C}$, $I = 4\text{A}$, $t = 2939.09/4 = 734.8$ seconds.

19. The anodic reaction during corrosion of iron is _____

A. $\text{Fe}_{(\text{s})} \rightarrow \text{Fe}^{3+}_{(\text{aq})} + 3e^-$

B. $\text{Fe}_{(\text{s})} \rightarrow \text{Fe}^{3+}_{(\text{aq})} + 2e^-$



The correct answer is option [B].

20. The following is a list of symbols of some of the elements in order of an 'activity series':

K, Mg, Al, Zn, Fe, H, Cu, Ag.

Which of these elements will not displace hydrogen from a dilute acid?

A. Cu.

B. Fe, Ag.

C. Fe.

D. Cu, Ag.

The correct answer is option [D].

21. The discharge of ions during electrolysis is dependent on the _____

(i) position of the ion in the e.c.s.

(ii) concentration of the ions.

(iii) nature of the electrode.

(iv) size of the ions.

A. (i) and (ii) only.

B. (i) and (iii) only.

C. (i), (ii) and (iii) only.

D. (i), (ii), (iii) and (iv).

The correct answer is option [D].

22. These are factors affecting standard electrode potential except _____

A. pressure.

B. overall energy change.

- C. the concentration of ions in the solution.
D. temperature.

The correct answer is option [A].

23. Which of the following substances will evolve hydrogen when it reacts with dilute hydrochloric acid?

- A. Ag.
B. Ca^{2+} .
C. Cu.
D. Fe.

The correct answer is option [D].

24. $\text{Zn}^{2+}_{(\text{aq})} | \text{Zn}_{(\text{s})} \quad E^\circ = + 0.76\text{V}$

$\text{Ag}^{+}_{(\text{aq})} | \text{Ag}_{(\text{s})} \quad E^\circ = + 0.80\text{V}$

From the information given above, what is the e.m.f. of the cell represented by the equation below?

$\text{Zn}^{2+}_{(\text{aq})} | \text{Zn}_{(\text{s})} || \text{Ag}^{+}_{(\text{aq})} | \text{Ag}_{(\text{s})}$

- A. -0.04.
B. +0.04.
C. +0.76.
D. +0.80.

The correct answer is option [B].

25. Half-cell electrode of copper system is represented conventionally as _____

- A. $\text{Cu}_{(\text{s})} | \text{Cu}^{2+}_{(\text{aq})}$.
B. $\text{Cu}^{2+}_{(\text{aq})} | \text{Cu}_{(\text{s})}$.
C. $\text{Cu}^{2+}_{(\text{aq})} || \text{Cu}_{(\text{s})}$.

D. $\text{Cu}||\text{Cu}^{2+}$.

The correct answer is option [B].

26. The direction of the current flow from a simple electrochemical cell is dependent on _____

- A. the concentration of electrolyte used.
- B. the electrodes.
- C. the relative positions of the electrodes on the electrochemical series.
- D. all of the above.

The correct answer is option [C].

27. If copper and zinc rods dipped into dilute sulphuric acid are connected externally by a metallic conductor _____

- A. electrons flow from zinc to copper as zinc atoms are reduced.
- B. electrons flow from zinc to copper as zinc atoms are oxidised.
- C. electrons flow from copper to zinc as copper atoms are reduced.
- D. electrons flow from copper to zinc as copper ions are oxidised.

The correct answer is option [B].

28. Given that M is the mass of a substance deposited in an electrolytic process and Q the quantity of electricity consumed, then Faraday's law can be written as _____

- A. $M = Z/Q$.
- B. $M = Q/Z$.
- C. $M = Z/2Q$.
- D. $M = QZ$.

The correct answer is option [D].

29. In the redox reaction of iron rust, the brown iron [iii] oxide is formed at the _____

- A. anode.

- B. anode and cathode.
- C. cathode.
- D. surface of the iron.

The correct answer is option [C].

Reason: The concentration of the oxygen obtained from air in the water is higher, this is reduced to form hydroxide ions at the cathodic region. The presence of the dissolved oxygen at the cathodic region oxidises the iron [II] hydroxide formed at the anodic and cathodic regions to form brown hydrated iron [III] oxide.

30. The characteristics of lead accumulator include the following except _____

- A. lead [IV] oxide.
- B. zinc [II] tetraoxosulphate.
- C. dilute tetraoxosulphate [VI] acid solution.
- D. metallic lead.

The correct answer is option [B].

31. A current is passed through three electrolytic cells connected in series containing solutions of silver trioxonitrate [V], copper [II] tetraoxosulphate [vi] and brine respectively. If 12.7g of copper are deposited in the second electrolytic cell, calculate the volume of chlorine liberated in third cell at 17°C and 800mmHg pressure.

[Cl = 35.5, 1F = 96500C, G. M. V. of gases at s. t. p. = 22.4dm³]

- A. 4.52dm³.
- B. 4.48dm³.
- C. 9.04dm³.
- D. 44.8ddm³.

The correct answer is option [A].

Solution: First calculate the quantity of electricity that deposits the mass of copper. The same quantity of electricity is used to deposit the mass of silver: $Q = It$; Ionic equation; $Cu^{2+}_{(aq)} + 2e \rightarrow Cu_{(s)}$; 2 moles of electrons deposits 63.5g of Cu; $\frac{2 \times 96500}{63.5}$ deposits 12.7g of Cu $\rightarrow \frac{2 \times 96500}{63.5} \times 12.7 = 38600C$; Ionic equation $2Cl_{(aq)} + 2e \rightarrow Cl_{2(g)}$; 2 moles of electrons liberates 1 mole of Cl_2 ; 2×96500 of electricity liberates 1 mole of Cl_2 ; 38600C of electricity liberates $\frac{38600}{2 \times 96500} = 0.2$ moles; Volume of chlorine at s.t.p.

using $P_1V_1/T_1 = P_2V_2/T_2$, where $P_1 = 800\text{mmHg}$, $V_1 = ?$, $T_1 = 17^\circ\text{C} = 273 + 17 = 290\text{K}$, $P_2 = 760\text{mmHg}$, $V_2 = 4.52\text{dm}^3$, $T_2 = 273\text{K}$. Substitute the values into the equation and solve for the volume.

32. The electrode potential of a given system depends on the following except _____

- A. overall energy change.
- B. type of electrolyte used.
- C. concentration of ions in the solution.
- D. temperature.

The correct answer is option [B].

33. Which of the following statements is not correct about the electrolysis of $\text{CuSO}_4(\text{aq})$ using copper cathode and platinum anode?

- A. Copper is deposited at the cathode.
- B. Oxygen is liberated at the anode.
- C. It is used for the purification of copper.
- D. The solution becomes acidic.

The correct answer is option [B].

34. When the potential difference of a metal is in contact with one-molar solution of its ions at 25°C , measured against a reference standard, it is known as _____

- A. electrochemical series.
- B. standard electrode potential.
- C. electrode potential.
- D. standard reaction potential.

The correct answer is option [B].

35. Lead accumulator is an example of a secondary cell therefore, it must be charged by passing _____

- A. direct current.
- B. stabilized current.
- C. alternating current.
- D. back current.

The correct answer is option [C].

36. In electrolysis, the electrode by which the conventional current enters the electrolyte or by which electrons leave an electrolyte is called _____

- A. anode.
- B. cathode.
- C. anion.
- D. cation.

The correct answer is option [A].

37. Which of the following reaction takes place at the anode of a lead accumulator when discharging?

- A. $\text{PbO}_{2(s)} + 4\text{H}^+_{(aq)} + 2\text{e}^- \rightarrow \text{Pb}^{2+}_{(aq)} + 2\text{H}_2\text{O}_{(l)}$.
- B. $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + 2\text{e}^-$.
- C. $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + \text{SO}^{2-}_{4(aq)} + 2\text{e}^- \rightarrow \text{PbSO}_{4(s)}$.
- D. $\text{Pb}_{(s)} \rightarrow \text{Pb}^{2+}_{(aq)} + \text{SO}^{2-}_{4(aq)} + 2\text{e}^-$.

The correct answer is option [C].

38. The quantity of electricity required to discharge 1 mole of univalent ion is _____

- A. 9,600 C.
- B. 48,250 C.
- C. 96,500 C.
- D. 193,000 C.

The correct answer is option [C].

39. Which of the following substances is a good conductor of electricity?

- A. Molten sulphur.
- B. Aqueous sucrose solution.
- C. Molten chalk.
- D. Solid chalk.

The correct answer is option [C].

40. An electric current is passed through a solution of copper [II] sulphate using platinum electrodes. The substance liberated at the anode is _____

- A. Copper.
- B. Sulphate.
- C. Oxygen.
- D. Hydrogen.

The correct answer is option [C].

41. What quantity of electricity is consumed when 5 amperes was passed in 1hr 45 mins during electrolysis?

- A. 31.5 kilocoulombs.
- B. 3150 coulombs.
- C. 15.8 kilocoulombs.
- D. 1580 coulombs.

The correct answer is option [A].

Solution: $Q = It$, where $I = 5A$, $t = 1 \text{ hr } 45 \text{ mins}$ equivalent to $105 \text{ mins} \rightarrow Q = 5 \times 105 \times 60 = 31500 \text{ coulomb}$ equivalent to $31.5 \text{ kilocoulombs}$.

42. Corrosion in iron is called _____

- A. tarnishing.
- B. rusting.
- C. electrode corrosion.

D. galvanization.

The correct answer is option [B].

43. Which of the following options are types of conductors?

- A. metallic and metalloid.
- B. electrolyte and metalloid.
- C. metallic and non-electrolyte.
- D. metallic and electrolyte.

The correct answer is option [D].

44. The major function of a salt bridge in cell is to _____

- A. smoothen the electron flow.
- B. provide electrolyte
- C. complete the electric circuit.
- D. provide adequate driving force.

The correct answer is option [C].

45. The chemical decomposition of a compound brought about by a direct current passing through either a solution of the compound or the molten compound is called _____

- A. electrolyte.
- B. electrolysis.
- C. electrolytic cell.
- D. electrode.

The correct answer is option [B].

46. Calculate the time required to deposit 1.6g of copper [II] tetraoxosulphate [vi] solution by passing a current of 0.50 ampere.

[take relative atomic mass of Cu = 63.5, S = 32, O = 16]

- A. 2431.5 seconds.
- B. 1216 seconds.
- C. 9726 seconds.
- D. 1936.1 seconds.

The correct answer is option [C].

Solution: Equation of the reaction: $\text{Cu}^{2+} + 2e \rightarrow \text{Cu}$. From the equation, 2 moles of electrons liberated 1 mole of Cu; 1 mole of Cu = 63.5g; 1 mole of electron is liberated by 96500C; 2 moles of electron is liberated by $2 \times 96500 = 193000\text{C} \rightarrow 193000\text{C}$ liberates 63.5g of Cu, then $193000/63.5$ liberates 1.6g of Cu = $193000/63.5 \times 1.6 = 4863\text{coulombs}$ time required to deposit 1.6g of Cu; Note, $Q = It$, $t = Q/I$, where $Q = 4863\text{ coulomb}$, $I = 0.5\text{A}$; $t = 4863/0.5 = 9726\text{ seconds}$.

47. When a metal plate is placed in a solution containing its ions, some of the atoms from the metal plate will ionize and go into solution as positively charged ions which of the following option favours the reaction?

- A. The electrode or metal plate becomes positively charged with respect to the solution/electrolyte.
- B. The electrode or metal plate becomes neutral with respect to the solution/electrolyte.
- C. The electrode or metal plate has more protons with respect to the solution/electrolyte.
- D. The electrode or metal plate becomes negatively charged with respect to the solution/electrolyte.

The correct answer is option [D].

48. Corrosion in metals is an example of _____

- A. electrochemical process.
- B. half-cell reaction.
- C. metal plating device.
- D. metal coupling device.

The correct answer is option [A].

49. In the preferential discharge of ions in electrolysis, a metal lower down in the activity series is discharged in preference to the one _____

- A. below the metal.
- B. above the metal.
- C. below hydrogen.
- D. above hydrogen.

The correct answer is option [B].

50. When a metal plate is placed in a solution containing its ions, some of the metallic ions in solution will take up electrons from the metal plate and deposit themselves as neutral atoms on the plate, which option favours the reaction?

- A. The electrode or metal plate becomes positively charged with respect to the solution/electrolyte.
- B. The electrode or metal plate becomes neutral with respect to the solution/electrolyte.
- C. The electrode or metal plate has more electrons with respect to the solution/electrolyte.
- D. The electrode or metal plate becomes negatively charged with respect to the solution/electrolyte.

The correct answer is option [A].

51. Which of the following statements is the best definition of an anode?

- A. It is the negatively charged electrode.
- B. It is the electrode at which electrons enter the electrolyte
- C. It is the positively charged electrode.
- D. It is the electrode at which hydrogen is evolved.

The correct answer is option [A].

52. What quantity of electricity is consumed when 15 amperes was consumed in $1\frac{1}{4}$ hrs during electrolysis?

- A. 67.5 coulomb.
- B. 675 coulomb.
- C. 67.5 kilocoulomb.
- D. 6750 coulomb.

The correct answer is option [C].

Solution: $Q = It$, where $I = 15A$, $t = 1\frac{1}{4}$ hrs is equivalent to 75 mins; $Q = 15 \times 75 \times 60 = 67\ 500$ coulomb = 67.5 kilocoulomb.

53. The quantity of electricity is mathematically expressed as _____

- A. $Q = mIt$.
- B. $Q = Eit$.
- C. $Q = mVt$.
- D. $Q = It$.

The correct answer is option [D].

54. Electromotive force of an electrochemical cell is given by _____

- A. algebraic product between the electrode potentials of the electrodes.
- B. algebraic difference between the electrode potentials of the electrodes.
- C. algebraic sum between the electrode potentials of the electrodes.
- D. algebraic zero between the electrode potentials of the electrodes.

The correct answer is option [B].

55. Find the volume of oxygen liberated by 9650 coulombs of electricity.

[O = 16, 1F = 96,500C, G. M. V. of gas at s. t. p. = 22.4dm³]

- A. 17.92dm³.
- B. 1.12dm³.

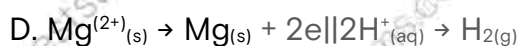
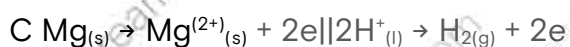
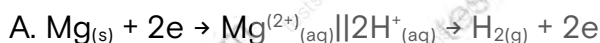
C. 0.56dm³.

D. 2.24dm³.

The correct answer is option [C].

Solution: Ionic equation: $4OH_{(aq)} \rightarrow 2H_2O_{(l)} + O_{2(g)} + 4e^-$; 4 moles of electrons liberates 1 mole of O_2 ; 4×96500 of electricity liberates 1 mole of O_2 ; 9650 of electricity liberates $9650 / 4 \times 96500 = 0.025$ moles; 1 mole of $O_2 = 22.4dm^3$; 0.025 moles of $O_2 = 22.4 \times 0.025 = 0.56dm^3$.

56. Which of the following is the correct ionic equation for the reaction between magnesium and dilute hydrochloric acid?



The correct answer is option [B].

57. Calculate the mass of aluminium deposited when a current of 5.0 amperes is passed through an aluminium electrolyte for 1hr 30 mins.

[Al = 27, 1 Faraday = 96 500 coulomb]

A. 2.52g.

B. 7.55g.

C. 3.78g.

D. 0.042g.

The correct answer is option [A].

Solution: First write the ionic equation; $Al^{3+}_{(aq)} + 3e^- \rightarrow Al_{(s)}$; 3 moles of electrons deposits 1 mole of Al $\rightarrow 3 \times 96\ 500$ deposits 27g. Note: $Q = It = 5 \times 90 \times 60$ deposits; $27000 / 289500 \times 27 = 2.52g$.

58. Electrode potential value of pure hydrogen at all temperatures is _____

A. 1.

- B. zero.
- C. 2.
- D. 0.5.

The correct answer is option [B].

59. Which of the following equimolar solutions would have the highest conductivity?

- A. $\text{NH}_4\text{NO}_3(\text{aq})$.
- B. $\text{NaNO}_3(\text{aq})$.
- C. $\text{Mg}(\text{NO}_3)_2(\text{aq})$.
- D. $\text{Al}(\text{NO}_3)_3(\text{aq})$.

The correct answer is option [D].

60. The overall redox reactions occurring at the electrodes is represented as (in copper | zinc cell) $\text{Cu}^{2+}(\text{aq})|\text{Cu}(\text{s})||\text{Zn}(\text{s})|\text{Zn}^{2+}(\text{aq})$, the double represents _____

- A. capacitor.
- B. battery.
- C. salt bridge.
- D. inert conductor.

The correct answer is option [C].

61. In the activity series of metals, metals higher up will serve as _____

- A. cathode.
- B. anode.
- C. salt bridge.
- D. none of the above.

The correct answer is option [A]. Reason: Metals higher up in the activity series are more electropositive than metals lower in the activity series and they are able to lose electrons easily.

62. In the following electrolytic experiment copper electrode was used as the anode and platinum as the cathode, what happens when an electric current is passed through copper [II] tetraoxosulphate [VI] solution?

- A. Hydrogen gas is liberated at the cathode while sulphur[iv] oxide gas is liberated at the anode.
- B. Copper is deposited at the cathode while oxygen gas is liberated at the anode.
- C. Copper is deposited at the cathode while water is formed at the anode.
- D. Hydrogen gas is liberated at the cathode while oxygen gas is liberated at the anode.

The correct answer is option [B].

63. The quantity of products liberated at the electrode during an electrolysis is dependent on _____

- [i] magnitude of the steady current passed.
- [ii] time of flow of the steady current.
- [iii] ionic charge of the liberated element.

- A. [i], [ii], [iii].
- B. [ii] only.
- C. [ii] and [iii].
- D. [i] and [iii].

The correct answer is option [A].

64. _____ is the chemical decomposition of a compound by which direct current passes through the solution of the compound or the molten compound.

- A. Galvanization
- B. Electrode potential
- C. Electrolysis
- D. Electrochemical cells

The correct answer is option [C].

65. In which of the electrodes does oxidation occur?

- A. At the cathode.
- B. At the anode.
- C. At the electrolyte.
- D. At the half electrode.

The correct answer is option [B].

66. One faraday is equal to _____

- A. 9650 coulombs.
- B. 96 500 coulombs.
- C. one mole of electrons.
- D. two a mole of electrons.

The correct answer is option [C].

67. In the electrolysis of brine, the anode is _____

- A. aluminium.
- B. carbon.
- C. copper.
- D. platinum.

The correct answer is option [B].

68. A current is passed through three electrolytic cells connected in series containing solutions of silver trioxonitrate [V], copper [II] tetraoxosulphate [VI] and brine respectively. If 12.7g of copper are deposited in the second electrolytic cell, calculate the mass of silver deposited in the first cell.

[AG = 108, Cu = 63.5, 1F = 96 500]

- A. 42.3g.
- B. 21.6g.
- C. 43.2g.

D. 86.4g.

The correct answer is option [C].

Solution: First calculate the quantity of electricity that deposits the mass of copper. The same quantity of electricity is used to deposit the mass of silver: $Q = It$; Ionic equation; $\text{Cu}^{2+}(\text{aq}) + 2\text{e} \rightarrow \text{Cu}(\text{s})$; 2 moles of electrons deposits 63.5g of Cu; $2 \times 96500 / 63.5$ deposits 12.7g of Cu $\rightarrow 2 \times 96500 / 63.5 \times 12.7 = 38600\text{C}$; Ionic equation $\text{Ag}^+ + \text{e} \rightarrow \text{Ag}(\text{s})$; 1 mole of electron deposits 1 mole Ag; 96500 of electricity deposits 108g of Ag; 38600 of electricity deposits $38600 / 96500 \times 108 = 43.2\text{g}$

69. _____ is used to remove hydrogen gas from an electrochemical cell.

- A. Ammonium chloride
- B. Magnesium oxide
- C. Manganese [IV] oxide
- D. Zinc [II] tetraoxosulphate

The correct answer is option [C].

70. An electric current was passed through an unknown solution. The gases which were evolved were collected and tested. The gas from the anode bleached damp litmus paper and the gas from the cathode burned with a squeaky pop. The solution was probably that of _____

- A. copper [II] sulphate.
- B. hydrochloric acid.
- C. nitric acid.
- D. tetraoxosulphate [VI] acid.

The correct answer is option [B].

71. The electrode potential is positive when _____

- A. electrons flow from the hydrogen electrode to the metal electrode.
- B. electrons flow from both hydrogen electrode and metal electrode are equal.
- C. electrons do not flow from the hydrogen electrode to the metal electrode.

D. electrons flow from the metal electrode to the hydrogen electrode.

The correct answer is option [A].

72. What are the products of the electrolysis of concentrated calcium chloride solution?

A. Ca, Cl₂

B. Ca, O₂

C. H₂, Cl₂

D. Ca, H₂, Cl₂

The correct answer is option [C].

73. What happens when an electric current is passed through copper [II] chloride solution using carbon electrodes?

A. Hydrogen gas is liberated at the cathode while chlorine gas is liberated at the anode.

B. Copper is deposited at the cathode while oxygen gas is liberated at the anode.

C. Hydrogen gas is liberated at the cathode while water is formed at the anode.

D. Hydrogen gas is liberated at the cathode while oxygen gas is liberated at the anode.

The correct answer is option [D].

74. In an electrochemical cell, the exchange of ions between the cells occur through the _____

A. copper wire.

B. electrodes.

C. electrons.

D. salt bridge.

The correct answer is option [B].

75. The following is a list of symbols of some of the elements in order of an activity series:

K, Mg, Al, Zn, Fe, H, Cu, Ag.

Which of these elements reacts with cold water?

- A. K.
- B. Al.
- C. Mg.
- D. Zn.

The correct answer is option [A].

76. During discharging process of a lead accumulator _____

- A. the density of the acid and e.m.f. increases.
- B. the density of the acid and e.m.f. are the same.
- C. the density of the acid and e.m.f. is zero.
- D. the density of the acid and e.m.f. decreases.

The correct answer is option [D]. Reason The density of the acid decreases to 1.15g cm^{-3} , due to the absorption of hydrogen and tetraoxosulphate [vi] ions from the electrolyte and the e.m.f. of the cells decreases to 1.8V.

77. 0.25 amperes flowing for 40 mins deposits 0.198g of a certain metal at the cathode. The weight of the metal deposited by 1 coulomb is _____

- A. 0.00011 g.
- B. 0.00033 g.
- C. 0.00066 g.
- D. 0.00044 g.

The correct answer is option [B]. Solution: Using the equation: $m = zIt$, where $It = 0.25 \times 40 \times 60 = 600\text{ C}$; Mass deposited by 1 C = $0.198/600 = 0.00033\text{ g}$.

78. In the electrolysis of a solution of copper [ii] tetraoxosulphate [vi] using copper electrodes, these results were obtained:

Mass of copper anode before experiment = 14.40g.

Mass of copper anode after experiment = 8.00g.

Mass of copper cathode before experiment = 11.50g.

Mass of copper cathode after experiment = 18.10g.

Given that one faraday is 96,500C and that the current used to carry out the electrolysis was 2 kilo-ampere,

find how long it took to carry out the electrolysis.

[Cu = 63.5]

- A. 100.3 seconds.
- B. 10.03 seconds.
- C. 97.3 seconds.
- D. 9.73 seconds.

The correct answer is option [B]. Solution: Mass of copper deposited is 6.6g; Note that $Q = It$; Ionic equation: $Cu^{2+}_{(aq)} + 2e \rightarrow Cu_{(s)}$; 2 moles of electrons deposits 1 mole of Cu; 2×96500 of electricity deposits 63.5g of Cu $\frac{2 \times 96500}{63.5}$ deposits $\frac{2 \times 96500}{63.5} \times 6.6 = 20,059.8C$; Recall: $Q = It$, where $Q = 20,059.8C$, $I = 2$ kilo-ampere = 2×10^3A , $t = \frac{Q}{I} = 10.03$ seconds.

79. The characteristics of a leclanché cell include the following except _____

- A. zinc and carbon electrode.
- B. ammonium chloride solution.
- C. zinc [II] tetraoxosulphate.
- D. manganese [IV] oxide.

The correct answer is option [C].

80. The following conditions govern the discharge of ions except _____

- A. position of the ions in the activity series.
- B. concentration of ions in the electrolyte.

- C. temperature of the electrolyte.
- D. nature of electrode.

The correct answer is option [C].

81. The Daniel cell is a simple voltaic cell which produces an e.m.f of about _____.

- A. 12 volts.
- B. 6.4 volts.
- C. 2.12 volts.
- D. 1.15 volts.

The correct answer is option [D].

82. Two half cells which are capable of converting chemical energy to electrical energy is called _____

- A. a cell.
- B. electrochemical cell.
- C. chemical potential.
- D. metallic potential.

The correct answer is option [B].

83. Calculate the amount of gold deposited when a current of 4A is passed through a solution of gold salt for 2 hrs 10 mins.

[Au = 197, 1 Faraday = 96 500C]

- A. 6.37g.
- B. 1.06g.
- C. 31.8g
- D. 63.7g.

The correct answer is option [D].

*Solution: $Q = It = 4 \times 130 \times 60 = 31200$ coulomb. Writing ionic equation of reaction:
 $Au^{+}(aq) + e \rightarrow Au(s)$; 1 mole of electron deposits 1 mole of Au; 1 x 96 500 coulomb of*

electricity deposits 197g of Au \rightarrow 31200 coulomb of electricity deposits $31200/1 \times 96500 \times 197 = 63.7g$.

84. In the electrolysis of brine, the anode must be carbon because _____

- A. chlorine does not reduce carbon.
- B. carbon is a reducing agent.
- C. carbon induces the discharge of chlorine.
- D. chlorine attacks other elements but not carbon.

The correct answer is option [D].

85. The following is a list of symbols of some of the elements in order of an activity series:

K, Mg, Al, Zn, Fe, H, Cu, Ag.

Which of these elements does not react with water?

- A. Fe, Cu.
- B. Ag, Zn.
- C. Cu, Ag.
- D. Ag, Fe.

The correct answer is option [C].

86. The half-cell reaction with their appropriate oxidation potentials are

$Pb \rightarrow Pb^{2+} + 2e$ (e.m.f = 0.13volt)

$Ag \rightarrow Ag^+ + e^-$ (e.m.f = 0.80volt)

Which of the following reactions takes place?

- A. $Pb^{2+} + 2Ag \rightarrow 2Ag^+ + Pb$.
- B. $Pb^{2+} + Ag \rightarrow Ag^+ + Pb$.
- C. $Ag^{2+} + Pb \rightarrow Ag + Pb^{2+}$.
- D. $2Ag^+ + Pb \rightarrow 2Ag + Pb^{2+}$.

The correct answer is option [D].

TOPIC: HYDROGEN AND OXYGEN COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. An isotope of hydrogen commonly referred to as heavy water is _____

- A. protium.
- B. tritium.
- C. deuterium.
- D. basic water.

The correct answer is option [C].

2. Hydrogen is manufactured via the following methods except _____

- A. action of steam on iron.
- B. action of steam on red-hot coke.
- C. action of steam on methane under nickel catalyst.
- D. electrolytic method.

The correct answer is option [A].

3. Most acid anhydrides react with water to form acids. Which of these is a mixed anhydride?

- A. N_2O .
- B. NO .
- C. NO_2 .
- D. SO_2 .

The correct answer is option [C].

4. The following are physical properties of hydrogen except _____

- A. it is a colourless, odourless and tasteless gas.
- B. it is neutral to moist litmus paper.

- C. it is slightly soluble in water.
- D. it is less dense than air.

The correct answer is option [C].

5. All, except one metal can displace hydrogen from water or acids.

- A. Zinc.
- B. Silver.
- C. Potassium.
- D. Heated magnesium.

The correct answer is option [B].

6. The oxidation state of hydrogen in the hydride of nitrogen is _____

- A. +1.
- B. +3.
- C. -3.
- D. -1.

The correct answer is option [C].

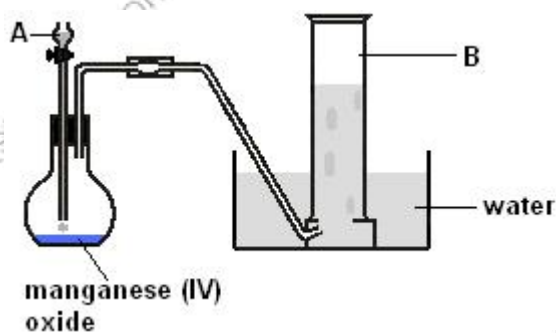
*Solution: The hydride of nitrogen is $N_2H_2 = [+3 \times 2] + [2x]$
 $x = -6/2 = -3.$*

7. The following are distinct property that differentiates oxygen from dinitrogen (I) oxide except _____

- A. smell.
- B. solubility in water.
- C. reaction with nitrogen (IV) oxide.
- D. reaction with heated copper.

The correct answer is option [C].

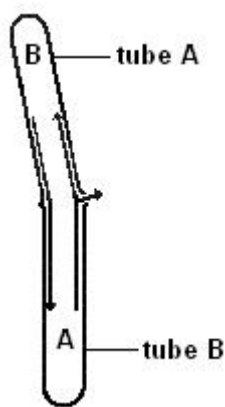
8. The diagram drawn is an illustration of the experiment for the _____



- A. preparation of oxygen from potassium trioxochlorate (V).
- B. preparation of oxygen from potassium heptaoxochromate (VI).
- C. study the reducing action of oxygen,
- D. preparation of oxygen from hydrogen peroxide solution.

The correct answer is option [D].

9. From the diagram drawn the part labelled B is _____



- A. air.
- B. chlorine.
- C. hydrogen.
- D. oxygen.

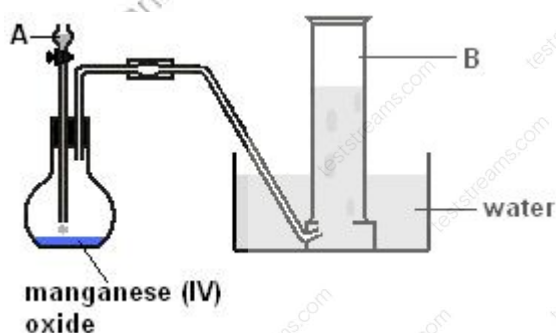
The correct answer is option [A].

10. The chemical behaviour of hydrogen can be explained by the following except _____

- A. it accepts an electron from another atom to form the negative hydride ion, H^- .
- B. it donates its electron to form positive hydrogen ion, H^+ , and enters into electrovalent bond formation.
- C. it forms a covalent bond by sharing its lone electron as in the hydrogen molecule, $H-H$.
- D. it donates its lone electron to form the positive hydrogen ion, H^+ , and enters into coordinate bond formation with molecules having lone pairs of electrons.

The correct answer is option [B].

11. From the diagram drawn, the part labelled A is _____



- A. potassium trioxochlorate (V).
- B. potassium heptaoxochromate (VI).
- C. hydrogen peroxide.
- D. hydrochloric acid.

The correct answer is option [C].

12. Which of these is not an amphoteric oxide?

- A. ZnO .
- B. Al_2O_3 .
- C. SnO_2 .
- D. Na_2O_2 .

The correct answer is option [D].

13. Which of these gases has the following chemical characteristics?

- (i) Combine with other elements except rare gases
- (ii) Combines with some halogens
- (iii) Forms multiple bonds with itself

- A. CO.
- B. N₂.
- C. O₂.
- D. H₂.

The correct answer is option [C].

14. Which of these reactions with oxygen is slowest?

- A. Rusting.
- B. Fe + O₂.
- C. Petrol + O₂.
- D. Coal + O₂.

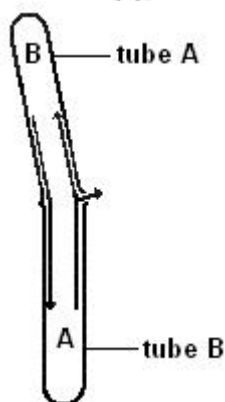
The correct answer is option [A].

15. The following are methods of laboratory preparation of hydrogen except _____

- A. action of zinc on an acid.
- B. action of non-metals on an acid.
- C. action of sodium on cold water.
- D. action of iron on steam.

The correct answer is option [B].

16. The diagram drawn is an illustration _____



- A. to study the reaction of hydrogen with other metals.
- B. to test for hydrogen.
- C. to demonstration that hydrogen is lighter than air.
- D. to show the reducing action of hydrogen.

The correct answer is option [C].

17. Oxygen is prepared in the laboratory by the following methods with the exception of _____

- A. decomposition of potassium trioxochlorate (V).
- B. oxidation of hydrogen peroxide.
- C. decomposition of potassium heptaoxochromate (VI).
- D. decomposition of hydrogen peroxide.

The correct answer is option [C].

18. Which of the following metals will not give hydrogen when combined with dilute hydrochloric acid?

- A. Cu.
- B. Fe.
- C. Mg.
- D. Zn.

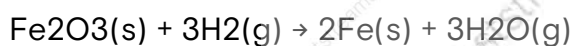
The correct answer is option [A].

19. When a non-metal combines with oxygen, _____ is formed.

- A. basic oxide
- B. amphoteric oxide
- C. neutral oxide
- D. acidic oxid

The correct answer is option [D].

20. From the reaction given below;



hydrogen is behaving as a _____

- A. oxidizing agent.
- B. reducing agent.
- C. steam donor.
- D. hydride.

The correct answer is option [B].

21. These are various methods of preparing oxygen except _____

- A. $\text{KI}(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$
- B. $\text{KMnO}_4(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) \rightarrow$
- C. $\text{H}_2\text{O}_2(\text{aq}) \rightarrow$
- D. $\text{MnO}_2(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) \rightarrow$

The correct answer is option [A].

22. Plants are green because they contain _____

- A. chlorophyll.
- B. hemoglobin.
- C. glucose.

D. vitamin C.

The correct answer is option [A].

23. Which of the following options is the correct order by which metals displace hydrogen when reacting with acid?

A. $\text{Na} > \text{Ca} > \text{Mg} > \text{Zn}$.

B. $\text{Na} < \text{Ca} < \text{Mg} < \text{Zn}$.

C. $\text{Na} < \text{Ca} > \text{Mg} < \text{Zn}$.

D. $\text{Na} > \text{Ca} < \text{Mg} > \text{Zn}$.

The correct answer is option [A].

24. The following except _____ are examples of neutral oxides.

A. nitrogen (II) oxide.

B. carbon (II) oxide.

C. water.

D. nitrogen (I) oxide.

The correct answer is option [A].

25. Hydrogen is manufactured by _____

A. Bosch process.

B. Solvay process

C. Frasch process.

D. Contact process.

The correct answer is option [A].

26. What is the name of the gas with the following characteristics?

(i) A good bleaching agent

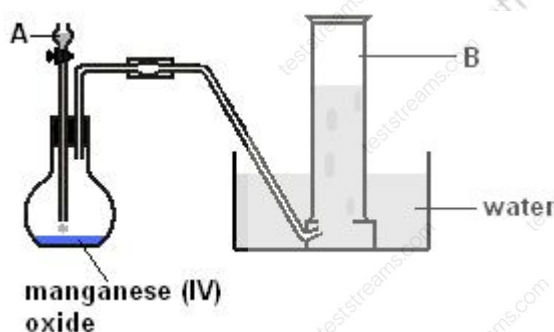
(ii) Used in ventilating stuffy chambers.

(iii) Used as a disinfectant in water and sewage.

- A. CO .
- B. Cl_2 .
- C. O_3 .
- D. N_2O .

The correct answer is option [C].

27. From the diagram drawn, the part labelled B is _____



- A. oxygen.
- B. hydrogen.
- C. ozone.
- D. nitrogen.

The correct answer is option [A].

28. Which of these gases has the following physical properties?

- (i) Diatomic gas.
- (ii) Colourless, tasteless and odourless.
- (iii) Slightly soluble in water.
- (iv) Liquefies easily.

- A. CO .
- B. N_2 .
- C. O_2 .

D. H_2 .

The correct answer is option [C].

29. When a lighted splinter is introduced into a test tube containing an unknown gas a _____ sound is heard showing that the gas is _____

A. pop, oxygen.

B. pop, hydrogen.

C. pop, hydrogen sulphide.

D. pop, hydrogen chloride.

The correct answer is option [B].

30. Oxygen was officially discovered by _____

A. Carl Wilhelm Scheele.

B. Joseph Priestley.

C. Antoine Lavoisier.

D. Henry Cavendish.

The correct answer is option [B].

31. Which of these oxides occur in snow, dew, air and water when exposed to brilliant sunlight?

A. K_2O .

B. H_2O_2 .

C. Pb_3O_4 .

D. Fe_3O_4 .

The correct answer is option [B].

32. Sodium hydride reacts with water to _____

A. form an acidic solution.

- B. liberate hydrogen gas.
- C. form a salt.
- D. liberate oxygen.

The correct answer is option [B].

33. The oxides formed when elements combine with oxygen are classified into the following groups except _____

- A. basic oxides.
- B. neutral oxides.
- C. peroxides.
- D. acidic oxides.

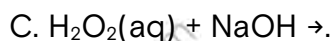
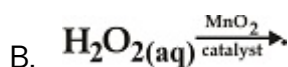
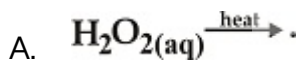
The correct answer is option [C].

34. The most abundant element on earth is _____

- A. nitrogen.
- B. helium.
- C. silicon.
- D. oxygen.

The correct answer is option [D].

35. The decomposition of hydrogen peroxide is accelerated by these treatments except _____



The correct answer is option [D].

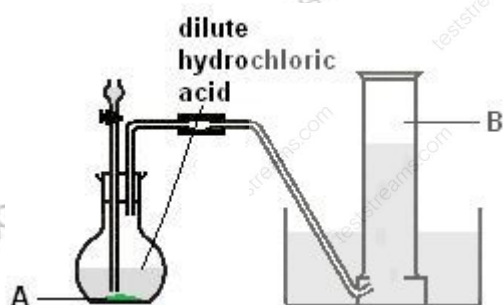
36. The diagram drawn is an illustration of the experiment for the _____



- A. preparation of oxygen by the action of dilute acid on lead.
- B. preparation of hydrogen by the action of dilute acid on copper.
- C. preparation of chlorine by the action of dilute acid on iron.
- D. preparation of hydrogen by the action of dilute acid on zinc.

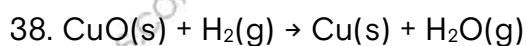
The correct answer is option [D].

37. From the diagram drawn, the part labelled B is _____



- A. chlorine.
- B. hydrogen.
- C. oxygen.
- D. carbon (IV) oxide.

The correct answer is option [B].



from the reaction given above, hydrogen is acting as a _____

- A. reducing agent.

- B. oxidizing agent.
- C. dehydrating agent.
- D. drying agent.

The correct answer is option [A].

39. The following are elements that form amphoteric oxides when combined with oxygen except _____

- A. copper.
- B. aluminium.
- C. tin.
- D. lead.

The correct answer is option [A].

TOPIC: METALS AND ITS COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. Which of the following statements is not true of tin?

- A. It is a p-block element
- B. It is extracted from cassiterite, SnO₂
- C. It is used for protecting iron containers from corrosion
- D. It combines with copper to form the alloy brass

The correct answer is option [A].

2. Which of the following additions could improve the quality of steel?

- A. Silicon.
- B. Sulphur and phosphorus.
- C. Carbon.
- D. Chromium and nickel.

The correct answer is option [C].

3. Sodium chloride has a solubility product value because of it's _____

- A. saline nature.
- B. high solubility.
- C. low solubility.
- D. insolubility.

The correct answer is option [B].

4. The products of combustion of magnesium in air are _____

- A. magnesium oxide only.
- B. magnesium oxide + magnesium hydroxide.

- C. magnesium oxide + magnesium dioxide.
- D. magnesium oxide + magnesium nitride.

The correct answer is option [A].

5. Which of the following metals can be found in a pure state in nature?

- A. Lithium
- B. Iron
- C. Gold
- D. Aluminium

The correct answer is option [C].

6. Which of the following metals will give the most vigorous reaction with water?

- A. Aluminum.
- B. Calcium.
- C. Magnesium.
- D. Sodium.

The correct answer is option [D].

7. Which of the following metals exists as liquid at ordinary temperature?

- A. Copper.
- B. Gold.
- C. Mercury.
- D. Silver.

The correct answer is option [C].

8. The green colour solution of an iron (II) salt changes to a brown colour solution of iron (III) salt by a process known as _____

- A. conversion.

- B. elimination.
- C. oxidation.
- D. reduction.

The correct answer is option [C].

9. Alloys are mixtures of pure metals, which statement tends to be true of alloys?

- A. The melting point of an alloy is usually lower than the melting points of the pure metals.
- B. The melting point of an alloy tends to be higher than the melting points of its component metals.
- C. There is no general trend regarding melting points of alloys compared to melting points of the pure metal component.
- D. A and B.

The correct answer is option [A].

10. Most metals have _____

- A. high electronegativities.
- B. low electronegativities.
- C. small atomic radii.
- D. high ionization energies.

The correct answer is option [B].

11. Which of the following elements readily forms ions with charges of +2 and +3?

- A. Aluminium.
- B. Copper.
- C. Iron.
- D. Lead.

The correct answer is option [C].

12. Metals which burn on exposure to air are best stored under _____

- A. water.
- B. alcohol.
- C. vinegar.
- D. kerosene.

The correct answer is option [D].

13. Which of the following metals will produce hydrogen on reacting with dilute hydrochloric acid?

- (I) Zn.
 - (II) Mg.
 - (III) Fe.
 - (IV) Al.
- A. I & II.
 - B. III & IV.
 - C. I, II & III.
 - D. I, II, III & IV.

The correct answer is option [D].

14. Which of the following statements are correct of the compound with the formula $K_4Fe(CN)_6$?

- (I) It's IUPAC name is potassium hexacyanoferrate (II).
- (II) It has six ligands.
- (III) It is a complex salt of a transition metal.
- (IV) It is used to test for iron (iii) ions.

- A. I & II.
- B. III & IV.
- C. I, II & III.

D. I, II, III & IV.

The correct answer is option [D].

15. Which of these metals is present in brass, bronze and duralumin?

A. Al.

B. Cu.

C. Mg.

D. Sn.

The correct answer is option [B].

16. Stages in the extraction of tin from tinstone include _____

(I) washing with water.

(II) crushing the ore.

(III) smelting the ore.

(IV) electrolytic purification.

A. I & II.

B. III & IV.

C. I, II & III.

D. I, II, III & IV.

The correct answer is option [D].

17. Which of the following is a waste product in the Solvay process for the manufacture of sodium trioxocarbonate (IV)?

A. Ammonium chloride

B. Calcium chloride

C. Limestone

D. Calcium oxide

The correct answer is option [B].

18. The ability of a metal to be drawn into wire is a measure of its _____.

- A. ductility
- B. hardness
- C. malleability
- D. strength

The correct answer is option [A].

19. Potassium and sodium show similar chemical properties because they _____

- A. belong to the same group in the periodic table.
- B. have equal number of electrons in their outermost shells.
- C. both exist in the +1 oxidation state in their compounds..
- D. A, B, and C

The correct answer is option [D].

20. Which of these metals constitutes the alloy of bronze in its simplest form?

- A. Copper and tin.
- B. Copper and zinc.
- C. Copper, zinc, and nickel.
- D. Copper, tin, and lead.

The correct answer is option [A].

21. Copper can best be purified by _____

- A. roasting the impure copper in blast furnace.
- B. heating the oxide with coke.
- C. electrolyzing a copper (ii) salt solution using the impure copper as the anode.
- D. converting the impure copper to a trioxonitrate (v).

The correct answer is option [C].

22. Which of the following compounds is used for removing impurities from bauxite?

- A. NaOH.
- B. CaCO₃.
- C. H₂SO₄.
- D. Na₃Al F₆.

The correct answer is option [A].

23. The functions of limestone in the extraction of iron in the blast furnace is _____

- A. removal of the earthly impurities.
- B. decomposition of the iron ore.
- C. conversion of iron (III) to iron (II).
- D. generation of heat for the processor.

The correct answer is option [A].

24. Aqueous solution of hydroxide can be used to test for the presence of _____

- (I) Ca²⁺
- (II) Zn²⁺
- (III) NH₂⁺
- (IV) Cu²⁺

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

25. Which of the following statements is a property of transition metals?

- A. They are hard and have high melting metals.
- B. Their densities increases moving from left to right across the periodic table.

- C. They have low ionization energies.
D. All of the above.

The correct answer is option [D].

26. Which of the following are physical properties?

- I. Combustibility.
II. Heat conductivity.
III. Length.
IV. Brittleness.

A. ii, iii & iv.

B. ii & iv.

C. i, ii & iv.

D. all of the above.

The correct answer is option [A].

27. Which of the following is not a naturally occurring iron ore?

A. FeCl_2

B. Fe_2O_3

C. Fe_3O_4

D. FeCO_3

The correct answer is option [A].

28. The manufacture of plaster of paris is represented by the equation _____

A. $\text{Ca}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{H}_2\text{O}$

B. $\text{Ca}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

C. $\text{CaO} + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O}$.

D. $2(\text{CaSO}_4 \cdot 2\text{H}_2\text{O})_{(s)} \rightarrow (\text{CaSO}_4)_2 \cdot \text{H}_2\text{O}_{(s)} + 3\text{H}_2\text{O}$.

The correct answer is option [D].

29. Which of the following reactions will give a green gelatinous precipitate?

- A. $\text{Al}^{3+}(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{s}) + 3\text{Na}^+(\text{aq})$.
- B. $\text{Cu}^{2+}(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s}) + 2\text{Na}^+(\text{aq})$.
- C. $\text{Fe}^{2+}(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_2(\text{s}) + 2\text{Na}^+(\text{aq})$.
- D. $\text{Fe}^{3+}(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Fe}(\text{OH})_3(\text{s}) + 3\text{Na}^+(\text{aq})$.

The correct answer is option [C].

30. Galvanized metals are covered with a thin sheet of _____

- A. chromium.
- B. copper.
- C. tin.
- D. zinc.

The correct answer is option [D].

31. The substances used for making mortar include _____

- A. calcium oxide.
- B. water.
- C. sand.
- D. calcium trioxocarbonate (vi).

The correct answer is option [D].

32. The main characteristic feature of transition metals is that they _____.

- A. have the same atomic size
- B. are reducing agents
- C. form ions easily
- D. have variable oxidation states

The correct answer is option [D].

33. The properties of aluminium which make the metal useful in the manufacture of cooking utensils include it's:

- (I) resistance to corrosion
- (II) lightness and durability
- (III) ability to conduct heat and electricity
- (IV) ability to react

- A. I & II
- B. III & IV
- C. I, II & III
- D. I, II, III & IV

The correct answer is option [A].

34. Metals of the first transition series have special properties which are different from those of groups I and II elements because they have partially filled _____.

- A. d orbitals
- B. s orbitals
- C. f orbitals
- D. p orbitals

The correct answer is option [A].

35. Sodium _____

- (a) is an alkaline earth metal.
- (b) forms ions with a +2 charge.
- (c) can combine with iodine to form Na_2I .
- (d) is a non-metal.

- A. a, b & c.
- B. d only.
- C. b & d.

D. none of the above.

The correct answer is option [D].

36. The best way to distinguish between Na_2CO_3 and NaHCO_3 is by _____

- A. heating.
- B. adding acid.
- C. adding alkali.
- D. crystallization.

The correct answer is option [A].

37. The major component of the slag from the production of iron is _____.

- A. an alloy of calcium and iron
- B. coke
- C. impure tin
- D. calcium trioxosilicate (IV)

The correct answer is option [D]. Calcium Trioxo-Silicate (IV) mainly and other earthly impurities form the molten slay which floats on the molten iron on extraction.



38. The main function of limestone in the blast furnace is to _____

- A. act as a reducing agent.
- B. act as a catalyst.
- C. remove impurities.
- D. supply carbon (IV) oxide.

The correct answer is option [C].

39. Copper (II) tetraoxosulphate (VI) is widely used as _____

- A. fertilizer

- B. fungicide
- C. disinfectant
- D. purifier

The correct answer is option [B].

40. Which of these is not a property of metals?

- A. They conduct heat and electricity.
- B. They are ductile.
- C. They have variable oxidation states.
- D. They have high melting and boiling points.

The correct answer is option [C].

41. Rust is formed from iron and _____.

- A. hydrogen
- B. nitrogen
- C. oxygen
- D. sulphur

The correct answer is option [C].

42. Bauxite is the ore of _____

- A. aluminium.
- B. zinc.
- C. lead.
- D. magnesium.

The correct answer is option [A].

43. A suitable material for a match head can be made from a mixture of carbon, sulphur and potassium chlorate. Which best explains the role of the potassium chlorate?

- A. Acts as a catalyst to trigger the reaction.
- B. Absorbs poisonous gases formed in the combustion reaction.
- C. Burns exothermically with oxygen from the air.
- D. Produces oxygen to burn the sulphur.

The correct answer is option [D].

44. Aluminium is above iron in the electrochemical series, yet iron corrodes easily on exposure to air while aluminium does not. This is because aluminium _____

- A. has a lower density than iron.
- B. is a better conductor than iron.
- C. does not corrode spontaneously.
- D. forms a thin layer of inert oxide in moist air.

The correct answer is option [D].

45. The following metals are extracted by electrolytic method except _____

- A. potassium.
- B. calcium.
- C. sodium.
- D. tin.

The correct answer is option [D].

46. Alloys are used in preference to pure metals because _____

- A. metals are too hard.
- B. metals are ductile.
- C. metallic properties are improved in alloys.

D. alloys are a mixture of metals.

The correct answer is option [C].

47. Metals conduct electricity because they have free _____.

A. molecules

B. electrons

C. atoms

D. ions

The correct answer is option [B].

TOPIC: NITROGEN AND ITS COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. Which ammonium salt is used to prevent dizziness and fainting?

- A. ammonium chloride.
- B. ammonium tetraoxosulphate (VI).
- C. ammonium trioxocarbonate (IV).
- D. ammonium trioxonitrate (V).

The correct answer is option [C].

3. Ammonia reacts with excess chlorine to produce _____

- A. a chloride and free nitrogen.
- B. ammonia chloride.
- C. double chloride.
- D. a chloride and nitrogen (II) oxide.

The correct answer is option [A].

4. Oxidation of nitrogen in Mg_3N_2 is _____

- A. -3.
- B. +3.
- C. -2.
- D. +2.

The correct answer is option [A].

Solution: Mg_3N_2

the oxidation number of Mg is +2 and nitrogen = x

$$(+2 \times 3) + 2x = 0$$

$$x = \frac{-6}{2} = -3.$$

5. Which of the following does not play a direct role in the nitrogen cycle?

- A. Electrical discharge in the atmosphere.
- B. Decay of plants and animals.
- C. Erosion.
- D. Bacteria.

The correct answer is option [C].

6. During the laboratory preparation of nitrogen, carbon (IV) oxide and oxygen are removed by passing air through _____

- A. soda ash solution.
- B. caustic soda solution.
- C. potassium tetraoxomanganate (VII).
- D. slaked lime.

The correct answer is option [B].

7. Pure NO in an open gas jar is brown. This colour is easily removed by _____

- A. blowing excess air into the gas jar.
- B. bubbling the gas into caustic alkali.
- C. bubbling the gas into water.
- D. bubbling the gas into oxygen.

The correct answer is option [C].

8. Which of the following options is not a physical property of nitrogen (II) oxide?

- A. It is soluble in water.
- B. It is a colourless, poisonous gas with an unknown smell.
- C. It is slightly denser than air.
- D. It is neutral to litmus.

The correct answer is option [A].

9. Aqueous ammonia _____ the insoluble hydroxides of metals from solutions of their salts.

- A. precipitates
- B. reduces
- C. oxidizes
- D. dries

The correct answer is option [A].

10. Ammonia reduces copper (II) oxide to _____

- A. copper, water and dinitrogen (I) oxide.
- B. copper (I) oxide, water and nitrogen.
- C. copper, water and nitrogen (II) oxide.
- D. copper, water and nitrogen.

The correct answer is option [D].

11. Common laboratory drying agents are not used for drying ammonia because _____

- A. ammonia is alkaline.
- B. ammonia forms complexes with them.
- C. ammonia reacts with them and disappears into products.
- D. ammonia is highly soluble in water.

The correct answer is option [C].

12. The following ammonium salts decompose when heated mildly except _____

- A. $(\text{NH}_4)_2\text{SO}_4$.
- B. NH_4NO_2 .
- C. $(\text{NH}_4)_2\text{CO}_3$.
- D. NH_4Cl .

The correct answer is option [D].

13. The hydride of nitrogen which is capable of turning red litmus blue makes nitrogen to have an oxidation state of _____

- A. +2.
- B. -2.
- C. +3.
- D. -3.

The correct answer is option [B]. Solution: The hydride of nitrogen has a formula of N_2H_4 .

14. When a copper turning reacts with trioxonitrate (V) acid _____ is produced.

- A. nitrogen (IV) oxide
- B. nitrogen (II) oxide
- C. dinitrogen (I) oxide
- D. none of the above

The correct answer is option [B].

15. The product produced when tetraoxosulphate (VI) acid reacts with ammonia is _____

- A. ammonium chloride.
- B. ammonium trioxonitrate (V).
- C. ammonium tetraoxosulphate (VI).
- D. ammonium trioxocarbonate (IV).

The correct answer is option [C].

16. To test for dinitrogen (I) oxide _____

- A. a reagent is introduced.
- B. a damp litmus paper is used.
- C. a brightly glowing splinter is introduced.

D. none of the above.

The correct answer is option [C].

17. Trioxonitrate (V) acid is manufactured industrially by the _____

- A. reaction of nitrogen (IV) oxide with water.
- B. catalytic reduction of ammonium salts.
- C. oxidation of ammonia with air.
- D. catalytic oxidation of ammonia with excess air.

The correct answer is option [D].

18. Which of the following are physical properties of dinitrogen (I) oxide?

- (i) It is a colourless gas with a faint, pleasant but sickly smell and a sweetish taste.
- (ii) It is fairly soluble in cold water.
- (iii) It is neutral to moist litmus paper.
- (iv) It is less dense than air.

A. (i), (ii), (iii) and (iv).

B. (i), (ii) and (iv).

C. (i), (iii) and (iv).

D. (i), (ii) and (iii).

The correct answer is option [D].

19. Which of the options is not a physical property of nitrogen (IV) oxide?

- A. nitrogen (IV) oxide is a reddish-brown gas.
- B. neutral to litmus paper.
- C. It has an irritating smell and is poisonous.
- D. It is easily liquefied into a yellow liquid.

The correct answer is option [B].

20. Nitrogen combines directly with metals except _____

- A. Cu.
- B. Mg.
- C. Ca.
- D. Al.

The correct answer is option [A].

21. Pure trioxonitrate (V) acid is colourless but the product of its laboratory preparation is yellow because of the presence of dissolved _____

- A. sulphur.
- B. dinitrogen (I) oxide.
- C. sulphur (IV) oxide.
- D. nitrogen (IV) oxide.

The correct answer is option [D].

22. What acid was formerly known as aqua fortis?

- A. tetraoxosulphate (VI) acid.
- B. hydrochloric acid.
- C. trioxocarbonate (IV) acid.
- D. trioxonitrate (V) acid.

The correct answer is option [D].

23. Ammonia reacts with excess chlorine to produce _____

- A. a chloride and free nitrogen.
- B. ammonia chloride.
- C. double chloride.
- D. a chloride and nitrogen (II) oxide.

The correct answer is option [A].

24. The diagram drawn is an illustration of the experiment for the _____

- A. preparation of nitrogen from air.
- B. preparation of nitrogen (II) oxide.
- C. preparation of nitrogen from sodium trioxonitrate.
- D. preparation of dinitrogen (I) oxide.

The correct answer is option [A].

25. Ammonia has relatively high boiling point when compared with other similar compounds because _____

- A. ammonia is stable.
- B. ammonia is easily liquefied.
- C. ammonia has a density of 0.880g cm^{-3} which contains 35% by mass.
- D. ammonia has hydrogen bonding.

The correct answer is option [D].

26. Why is slaked lime used in the preparation of ammonia?

- A. It is deliquescent.
- B. It is cheap.
- C. It is cheap and deliquescent.
- D. It is easily decomposed.

The correct answer is option [C].

27. Nitrogen (IV) oxide is prepared by heating strongly _____

- A. lead (II) trioxonitrate (V).
- B. lead (II) chloride and trioxonitrate (V) acid.
- C. sodium trioxonitrate (V).
- D. lead (II) trioxocarbonate (IV) and trioxonitrate (V) acid.

The correct answer is option [A].

28. Aqueous ammonia _____ the insoluble hydroxides of metals from solutions of their salts.

- A. precipitates
- B. reduces
- C. oxidizes
- D. dries

The correct answer is option [A].

29. What is the products obtained when ammonia reacts with excess air in the presence of a heated platinum catalyst?

- A. Nitrogen and water.
- B. Nitrogen (II) oxide and water.
- C. Nitrogen and hydrogen.
- D. Nitrogen (II) oxide and hydrogen.

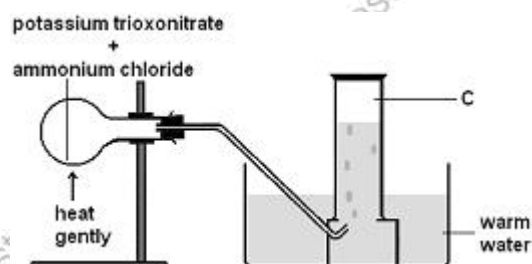
The correct answer is option [B].

30. The following ammonium salts decompose when heated mildly except _____

- A. $(\text{NH}_4)_2\text{SO}_4$.
- B. NH_4NO_2 .
- C. $(\text{NH}_4)_2\text{CO}_3$.
- D. NH_4Cl .

The correct answer is option [D].

31. The diagram drawn is an illustration of the experiment for the _____



- A. preparation of nitrogen (II) oxide.
- B. preparation of nitrogen (IV) oxide.
- C. preparation of ammonium salts.
- D. preparation of dinitrogen (I) oxide.

The correct answer is option [D].

32. To test for dinitrogen (I) oxide _____

- A. a reagent is introduced.
- B. a damp litmus paper is used.
- C. a brightly glowing splinter is introduced.
- D. none of the above.

The correct answer is option [C].

33. During the laboratory preparation of nitrogen, carbon (IV) oxide and oxygen are removed by passing air through _____

- A. soda ash solution.
- B. caustic soda solution.
- C. potassium tetraoxomanganate (VII).
- D. slaked lime.

The correct answer is option [B].

34. Trioxonitrate (V) acid is manufactured industrially by the _____

- A. reaction of nitrogen (IV) oxide with water.
- B. catalytic reduction of ammonium salts.
- C. oxidation of ammonia with air.
- D. catalytic oxidation of ammonia with excess air.

The correct answer is option [D].

35. Ammonia is manufactured by _____

- A. Contact process.
- B. Frasch process.
- C. Solvay process.
- D. Haber process.

The correct answer is option [D].

36. When a copper turning reacts with trioxonitrate (V) acid _____ is produced.

- A. nitrogen (IV) oxide
- B. nitrogen (II) oxide
- C. dinitrogen (I) oxide
- D. none of the above

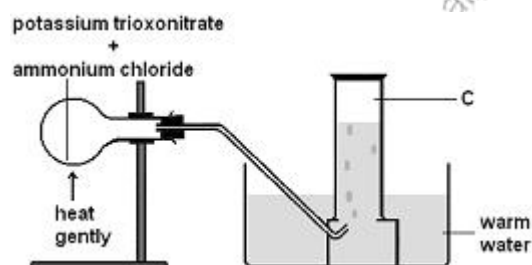
The correct answer is option [B].

37. Which of the options is not a physical property of nitrogen (IV) oxide?

- A. nitrogen (IV) oxide is a reddish-brown gas.
- B. neutral to litmus paper.
- C. It has an irritating smell and is poisonous.
- D. It is easily liquefied into a yellow liquid.

The correct answer is option [B].

38. The part labelled C is _____



- A. dinitrogen (I) oxide.

- B. nitrogen (II) oxide.
- C. nitrogen (IV) oxide.
- D. nitrogen.

The correct answer is option [A].

39. One of these methods produces impure nitrogen.

- A. $\text{NaNO}_{2(\text{aq})} + \text{NH}_4\text{Cl} \rightarrow$.
- B. $(\text{NH}_4)_2\text{Cr}_2\text{O}_{7(\text{s})} \rightarrow$.
- C. $\text{NH}_{3(\text{g})} + \text{CuO} \rightarrow$.
- D. Removing CO_2 and O_2 from dust free air..

The correct answer is option [D].

40. Which of the following does not play a direct role in the nitrogen cycle?

- A. Electrical discharge in the atmosphere.
- B. Decay of plants and animals.
- C. Erosion.
- D. Bacteria.

The correct answer is option [C].

41. Which of the following ammonium salts decomposes on heating to produce ammonia?

- (i) ammonium trioxocarbonate (IV).
- (ii) ammonium tetraoxosulphate (VI).
- (iii) ammonium dioxonitrate.
- (iv) ammonium trioxonitrate (V).

- A. (i) and (ii).
- B. (i), (ii) and (iv).
- C. (ii), (iii) and (iv).

D. (i), (ii), (iii) and (iv).

The correct answer is option [A].

42. Which of the following catalysts is used in the manufacture of ammonia?

- A. Finely divided iron.
- B. Finely divided nickel.
- C. Manganese (IV) oxide.
- D. Platinum.

The correct answer is option [A].

43. Which of the following options is not the correct property of ammonia?

- A. A colourless gas with a characteristic choking smell.
- B. It is an alkaline gas, changing moist red litmus paper blue.
- C. It is more denser than air.
- D. It is a very soluble gas.

The correct answer is option [C].

44. The hydride of nitrogen which is capable of turning red litmus blue makes nitrogen to have an oxidation state of _____

- A. +2.
- B. -2.
- C. +3.
- D. -3.

The correct answer is option [B]. Solution: The hydride of nitrogen has a formula of N_2H_4 .

45. Which of the following options is not a physical property of nitrogen (II) oxide?

- A. It is soluble in water.

- B. It is a colourless, poisonous gas with an unknown smell.
- C. It is slightly denser than air.
- D. It is neutral to litmus.

The correct answer is option [A].

46. Nitrogen has a very high bond strength and hard to break apart because _____

- A. it is reactive.
- B. it has a single bond between atoms in the molecule.
- C. it's molecular structure.
- D. it has a triple bond between atoms in the molecule.

The correct answer is option [D].

47. When ammonia reacts with excess chlorine _____ is formed.

- A. ammonium chloride
- B. hydrogen chloride
- C. nitrogen and chlorine
- D. nitrogen (III) chloride

The correct answer is option [D].

48. Oxidation of nitrogen in Mg_3N_2 is _____

- A. -3.
- B. +3.
- C. -2.
- D. +2.

The correct answer is option [A].

Solution: Mg_3N_2

the oxidation number of Mg is +2 and nitrogen = x

$$(+2 \times 3) + 2x = 0$$

$$x = -6/2 = -3.$$

49. Aqueous ammonia solution used in the laboratory is referred to as aqueous ammonia and not ammonium hydroxide because _____

- A. ammonia dissolves in water without forming bonds.
- B. ammonia solution easily decomposes and liberates free ammonia when the temperature of the room rises leaving water in the bottle.
- C. the bond between ammonia and OH⁻ of water is weakly acidic.
- D. ammonia is less dense than air.

The correct answer is option [B].

50. Nitrogen combines directly with metals except _____

- A. Cu.
- B. Mg.
- C. Ca.
- D. Al.

The correct answer is option [A].

51. Nitrogen (I) oxide rekindles a brightly glowing splint just like oxygen, but it is different from oxygen because _____

- A. it is less dense than oxygen.
- B. it is fairly soluble in water.
- C. it thermally decomposes before it rekindles glowing splint.
- D. it is only laughing gas.

The correct answer is option [B].

52. The following chemical compounds except _____ are used to produce nitrogen.

- A. sodium trioxonitrate

- B. ammonium dioxonitrate (III)
- C. ammonium heptaoxodichromate (VI)
- D. dinitrogen (I) oxide

The correct answer is option [A].

53. Which of the following are properties of nitrogen?

- (i) Nitrogen is a colourless, odourless and tasteless gas
- (ii) Pure nitrogen is slightly lighter than air
- (iii) It is slightly soluble in water
- (iv) Has very high melting and boiling point

- A. (i), (ii) and (iv).
- B. (i), (ii), (iii) and (iv).
- C. (i), (ii), and (iii).
- D. (ii), (iii) and (iv).

The correct answer is option [C].

54. X acid is colourless when pure, but often yellowish due to dissolved nitrogen (iv) oxide by slight decomposition of the acid. X is _____

- A. H_3PO_4 .
- B. HCl .
- C. HNO_3 .
- D. H_2SO_4 .

The correct answer is option [C].

TOPIC: ORGANIC CHEMISTRY

DIRECTION: Choose the correct options from the lettered options.

1. When an alcohol reacts with an acid. The products are _____

- A. an ester and water.
- B. an alkanolic acid and water.
- C. an alkane and a salt.
- D. an ester and ether.

The correct answer is option [A].

2. Which element is present in all organic compounds?

- A. Carbon.
- B. Nitrogen.
- C. Oxygen.
- D. Phosphorus.

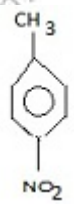
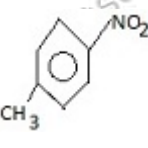
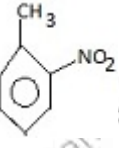
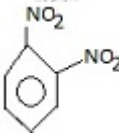
The correct answer is option [A]. In general, organic molecules contain carbon and is the study of carbon compounds.

3. Alkanoates are produced from alkanols by _____

- A. fermentation.
- B. saponification.
- C. oxidation.
- D. esterification.

The correct answer is option [D].

4. The structure of 2-nitro methylbenzene is _____

- A. 
- B. 
- C. 
- D. 

The correct answer is option [C]

5. Which of the following statements concerning ethene (C_2H_4) is correct?

- A. It readily dissolves in water.
- B. It readily undergoes substitution reactions with bromine.
- C. It readily undergoes addition reactions with bromine.
- D. It is a saturated hydrocarbon.

The correct answer is option [C].

6. Locally prepared soap in which wood ash is used as the base is usually soft because the wood ash contains a lot of _____

- A. sodium ions.
- B. potassium ions.
- C. lithium ions.

D. calcium ions.

The correct answer is option [B].

7. Which of the following hydrocarbons will produce benzene on polymerization?

A. Butane.

B. Ethyne.

C. Hexane.

D. Hexyne.

The correct answer is option [B].

8. What substance is made up of monomers joined together in long chains?

A. Ketone.

B. Protein.

C. Ester.

D. Acid.

The correct answer is option [B].

Proteins are composed of amino acids (monomers) joined into long chains.

9. An example of a polysaccharide is _____

A. dextrose.

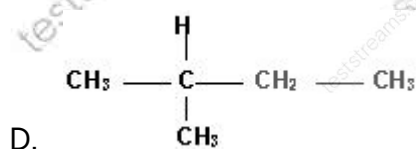
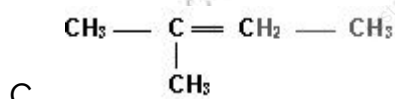
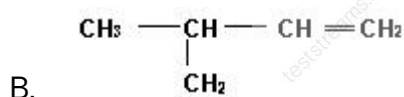
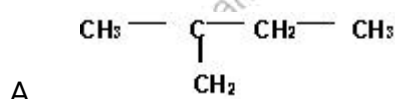
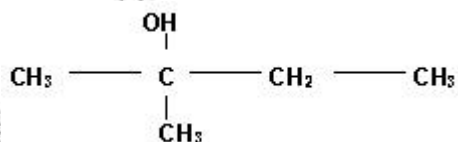
B. mannose.

C. glucose.

D. starch.

The correct answer is option [D]. Polysaccharides are a group of carbohydrates that are composed of very long chains of monosaccharides linked together by condensation.

10. The major product of the dehydration of the compound in the diagram is _____.



The correct answer is option [B].

11. Which of the following substances is trihydric?

- A. Ethanol.
- B. Glycol.
- C. Glycerol.
- D. Phenol.

The correct answer is option [C].

12. What is the product of the reaction between ethanol and excess acidified KMnO_4 solution?

- A. $\text{CH}_2 = \text{CH}_2$.
- B. CH_3COOH .

- C. $\text{CH}_3\text{-CH}_3$.
 D. $\text{CH}_3\text{-OCH}_3$.

The correct answer is option [B].

13. What is the name of the compound that has molecular formula C_6H_6 ?

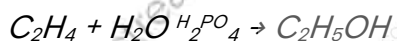
- A. Butane.
 B. Butene.
 C. Benzene.
 D. Butyne.

The correct answer is option [C]. Benzene has the formula C_6H_6 and is ring-shaped or shaped like a closed ring. C_4H_{10} is butane and has one single carbon bond; C_4H_8 is butene and has double carbon bonds.

14. Ethene when passed through concentrated H_2PO_4 is rapidly dissolved. The product is diluted with water and then warmed to produce _____

- A. ethanol.
 B. diethyl ether.
 C. ethanal.
 D. diethyl sulphate.

The correct answer is option [A].

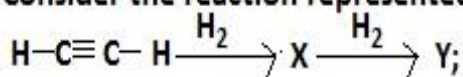


15. Which of the following hydrocarbons will undergo substitution and addition reactions?

- A. C_2H_2 .
 B. C_2H_4 .
 C. C_4H_{10} .
 D. C_6H_6 .

The correct answer is option [A].

16. Consider the reaction represented by the following equation:

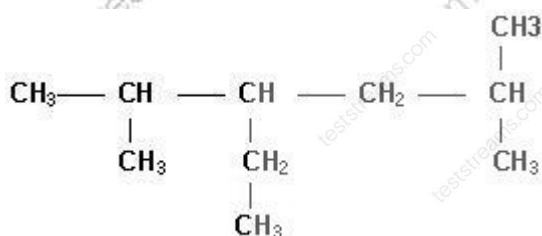


X and Y respectively are

- A. ethene and ethane.
- B. ethane and ethene.
- C. ethyne and ethene.
- D. ethene and propene.

The correct answer is option [A].

17. The IUPAC nomenclature of the organic compound with the given structural formula is _____



- A. 3-ethyl-2,5-dimethylhexane.
- B. 4-ethyl-2,5-dimethylhexane.
- C. 3-ethyl-,1,1,4-dimethylpentane.
- D. 3-ethyl-2,5,5-trimethylpentane.

The correct answer is option [A].

18. Which compounds in the options below are isomers?

- A. 1-propanol and 2-propanol.
- B. Methanoic acid and ethanoic acid.
- C. Methanol and methanol.
- D. Ethane and ethanol.
- E. Ethane and ethene.

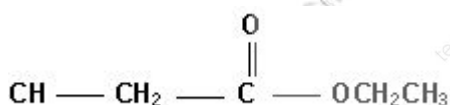
The correct answer is option [A]. By definition isomers have the same molecular formula but different structural formulas. The compounds in option [A] have the same molecular formula but the -OH group is located on the first or second carbon atom.

19. The reaction $\text{CH}_2=\text{CH}_2 + \text{H}_2 \rightarrow \text{CH}_3\text{CH}_3$ is an example of _____

- A. substitution.
- B. addition.
- C. esterification.
- D. fermentation.

The correct answer is option [B]. Addition usually involves adding one or more atoms at a double or triple bond. Here H_2 combines with $\text{CH}_2=\text{CH}_2$ changing ethene (double bond) into ethane (single bond).

20. The compound given is an



- A. ether.
- B. alkanol.
- C. ester.
- D. alkanal.

The correct answer is option [C].

21. Compound N reacts with sodium metal to produce a gas that gives a 'pop' sound with a burning splint. N also reacts with ethanoic acid to give a sweet smelling liquid. Compound N is _____

- A. an alkanol.
- B. an alkanoate.
- C. an alkane.

D. an alkanolic acid.

The correct answer is option [B].

22. Which of the following compounds is aromatic?

- A. Benzene
- B. Cyclobutane
- C. Cyclopentane
- D. Hexane

The correct answer is option [A].

23. How many isomers does pentane have?

- A. 3.
- B. 4.
- C. 5.
- D. 6.

The correct answer is option [A] They are 1. Normal Pentane, 2. Iso - Pentane, 3. Neo - Pentane.

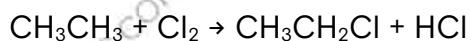
24. **Alkanol + Alkanoic acid** \rightleftharpoons **Ester + Water**

The reverse reaction of the equation is known as _____

- A. fermentation.
- B. hydration.
- C. hydrolysis.
- D. oxidation.

The correct answer is option [C].

25. The reaction below is a type of _____



- A. an addition reaction.
- B. a substitution reaction.
- C. a saponification reaction.
- D. an esterification reaction.

The correct answer is option [B].

In the above reaction, Cl substitutes one hydrogen atom.

26. The products of the fermentation of sugar are ethanol and _____

- A. water.
- B. oxygen.
- C. carbon dioxide.
- D. sulfur dioxide.

The correct answer is option [C]. By definition fermentation is the conversion of sugar by yeast enzymes (without oxygen) into ethanol and carbon dioxide. This happens in wine and when cider turns hard.

27. The carbon atoms in ethane are _____

- A. sp^3 hybridized.
- B. sp hybridized.
- C. sp^2 hybridized.
- D. not hybridized.

The correct answer is option [C].



The reaction represented by the equation above using zymase catalyst at a temperature of 25°C is known as _____.

- A. hydrolysis

- B. fermentation
- C. reduction
- D. condensation

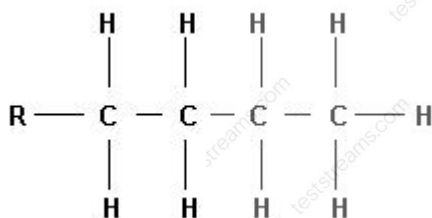
The correct answer is option [B].

29. Catalytic hydrogenation of oil results in the production of _____

- A. soaps.
- B. detergents.
- C. margarine.
- D. buffers.

The correct answer is option [C].

30. The compound with the structure given, where R is an alkyl group, is classified as _____



- A. an alkanolic acid.
- B. an unsaturated compound.
- C. an alkyl halide.
- D. an alkane.

The correct answer is option [D]. It is a saturated Alkane (Paraffin).

31. Which of the following formulae is that of a dicarboxylic acid?

- A. $(\text{CH}_3\text{CH}_2)_2\text{CHCOOH}$
- B. $\text{CH}_2(\text{OH})_2$.
- C. $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$

D. $\text{CH}_2(\text{COOH})_2$.

The correct answer is option [D].

32. An advantage of detergent over soap is that detergents _____

- A. are readily available.
- B. are in powdered form.
- C. are non-biodegradable.
- D. lather readily with water.

The correct answer is option [D].

33. Which of these reagents can confirm the presence of a triple bond?

- A. Copper (I) chloride.
- B. Acidified KMnO_4 .
- C. Bromine gas.
- D. Bromine water.

The correct answer is option [A].

34. Which of the following compounds exhibits both structural isomerism and cis – trans isomerism?

- A. C_4H_8 .
- B. CH_3OCH_3 .
- C. C_5H_{12} .
- D. C_6H_6 .

The correct answer is option [A].

35. Which of the following compounds is a member of the series with the general molecular formula $\text{C}_n\text{H}_{2n-2}$?

- A. C_2H_6 .

B. C_3H_4 .

C. C_3H_6 .

D. C_3H_8 .

The correct answer is option [B].

36. Which of the following exhibits resonance?

A. Benzene.

B. Butane.

C. Pentene.

D. Octane.

The correct answer is option [A].

Benzene is an aromatic hydrocarbon, and has a resonating structure.

37. The following are miscible with water except _____

A. ethylethanoate.

B. methanol.

C. ethanoic acid.

D. methanoic acid.

The correct answer is option [A].

38. During saponification, brine is added to soap paste in order to _____

A. separate glycerol from the soap curds.

B. prevent the formation of insoluble scum when used with hard water.

C. get the soap homogenized.

D. increase lather formation in laundry work.

The correct answer is option [A].

39. The products of fermentation of sugar are _____

- A. carbon (IV) oxide and water.
- B. ethanol and carbon (IV) oxide.
- C. ethanol and water.
- D. ethanol and enzymes.

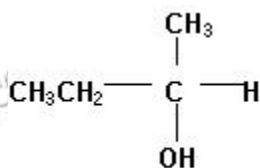
The correct answer is option [B].

40. In which of the following processes are larger molecules broken down into smaller molecules?

- A. Vulcanization of rubber.
- B. Hydrogenization of palm oil.
- C. Hydrolysis of starch.
- D. Polymerization.

The correct answer is option [C].

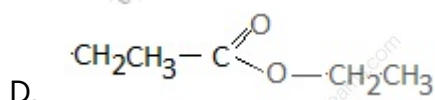
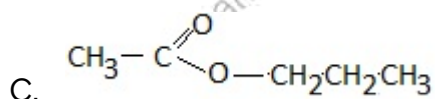
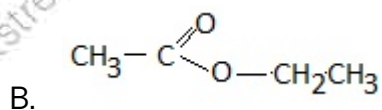
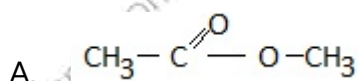
41. The compound given is a _____



- A. tertiary alkanol.
- B. primary alkanol.
- C. glycol.
- D. secondary alcohol.

The correct answer is option [D].

42. Which of the following structures represents that of ethylethanoate?



The correct answer is option [B].

43. The by-product of the fermentation of sugar to ethanol is _____

A. propane-1,2,3-triol.

B. ethyl ethanoate.

C. ethanedioic acid.

D. carbon (IV) oxide.

The correct answer is option [D].

44. Which molecule contains a total of three carbon atoms?

A. 2-methylpropane.

B. 2-methylbutane.

C. Propane.

D. Butane.

The correct answer is option [C].

Propane has 3 carbon atoms (prop- is a prefix for 3 carbon atoms).

45. When ethanol undergoes bacterial oxidation, it becomes sour due to _____

A. accumulation of bacteria in the ethanol.

- B. incomplete fermentation of the alkanol.
- C. long exposure of the alkanol to air.
- D. presence of ethanoic acid in the alkanol.

The correct answer is option [C].

46. Fats and oils are used as raw materials in the following industries except _____

- A. paint industry.
- B. plastic industry.
- C. margarine industry.
- D. cosmetic industry.

The correct answer is option [B].

47. Which class of organic compound is represented by the equations?

$R-\frac{3}{4}OH$.

- A. Acids.
- B. Alcohols.
- C. Esters.
- D. Ethers.

The correct answer is option [B].

Alcohols by definition have the $\frac{3}{4}OH$ group covalently bonded to the end of a hydrocarbon(R). Organic acids have the formula $R-\frac{3}{4}COOH$; esters have the formula $R_1-\frac{3}{4}COOR_2$

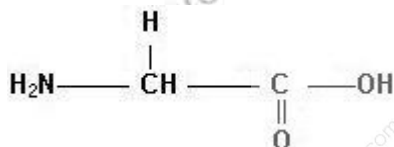
48. Which statement explains why the element carbon forms so many compounds?

- A. Carbon atoms combine readily with oxygen.
- B. Carbon atoms have a very high electronegativity.
- C. Carbon readily forms ionic bonds with other carbon atoms.
- D. Carbon readily forms covalent bonds with other carbon atoms.

The correct answer is option [D].

Carbon forms four covalent or shared bonds with other carbon atoms as well as many other kinds of atoms. It has an almost limitless ability to bond with other carbon atoms.

49. What is the IUPAC name of the following compound?



- A. 1 - aminoethanoic acid.
- B. 1 - aminomethanoic acid.
- C. 2 - aminoethanoic acid.
- D. 2 - aminomethanoic acid.

The correct answer is option [A].

50. Which substance is a hydrocarbon?

- A. H₂.
- B. CO.
- C. C₆H₁₂O₆.
- D. C₈H₁₈.

The correct answer is option [D].

51. Aromatic and aliphatic hydrocarbons can be distinguished from each other by _____

- A. action of bromine.
- B. use of polymerization reaction.
- C. action of heat.
- D. use of oxidation reaction.

The correct answer is option [C].

52. Which of these polymers occur naturally?

- A. Starch and nylon.
- B. Starch and cellulose.
- C. Protein and nylon.
- D. Protein and plastic.

The correct answer is option [B].

Plastic and nylon are synthetic (made in a laboratory). Starch and cellulose are natural polymers (large molecules composed of chains of smaller molecules).

53. Which property is generally characteristic of an organic compound?

- A. low melting point.
- B. high melting point.
- C. soluble in polar solvent.
- D. insoluble in nonpolar solvent.

The correct answer is option [A].

High melting points are characteristic of ionic compounds but organic compounds have low melting points.

54. Which of the following is true concerning the properties of benzene and hexane?

- A. Both undergo substitution reaction.
- B. Both undergo addition reaction.
- C. Both are solids.
- D. Both decolourise bromine water.

The correct answer is option [A].

Both undergo substitution reactions.

55. The following options are characteristics of enzymes except _____

- A. they are inorganic compounds.

- B. they are organic compounds.
- C. they are reaction specific.
- D. solubility in water.

The correct answer is option [A].

56. Which of the following is a property of ethanol?

- A. It is colourless.
- B. It is miscible with water.
- C. Its boiling point is 78°C .
- D. All of the above.

The correct answer is option [D].

57.



- A. isomers.
- B. esters.
- C. carboxylic acids.
- D. polymers.

The correct answer is option [A].

58. Ethanol can easily be produced by _____

- A. catalytic oxidation of methane.
- B. destructive distillation of coal.
- C. fermentation of starch.
- D. distillation of starch solution.

The correct answer is option [C].

59. Which compound is a saturated hydrocarbon?

- A. ethane.
- B. ethene.
- C. ethyne.
- D. ethanol.

The correct answer is option [A].

By definition saturated hydrocarbons share a single pair of electrons (single bond). The hydrocarbon series -ane has a single bond. (-ene has a double bond). -yne has a triple bond: and alcohols have one -OH group.

60. Polyvinyl chloride is used to produce _____

- A. bread.
- B. ink.
- C. pencils.
- D. pipes.

The correct answer is option [D].

61. $C_xH_y + 4O_2 \rightarrow 3CO_2 + 2H_2O$

The hydrocarbon C_xH_y in the reaction above is _____

- A. propyne.
- B. propanone.
- C. propene.
- D. propyl.

The correct answer is option [A].

62. If the third member of a homologous series is C_3H_8 , the fifth member will be _____

- A. C_5H_9 .
- B. C_5H_{10} .

C. C_5H_{11} .

D. C_5H_{12} .

The correct answer is option [D].

They belong to the homologous series with general formula C_nH_{2n+2} .

63. How many isomers can be obtained from C_4H_{10} ?

A. 0.

B. 1.

C. 2.

D. 3.

The correct answer is option [C].

64. Which compound is an organic acid?

A. CH_3OH

B. CH_3OCH_3

C. CH_3COOH

D. CH_3COOH_3

The correct answer is option [C].

Organic acids end in COOH

65. An example of a buffer solution is _____

A. ethanoic acid and sodium ethanoate.

B. tetraoxosulphate (VI) acid and Sodium hydroxide.

C. hydrochloric acid and Aqueous ammonia.

D. bromine water and Benedict's Solution.

The correct answer is option [A].

66. Compared to the rate of organic reactions, the rate of inorganic reactions generally is _____

- A. slower because organic particles are low.
- B. slower because organic particles contain covalent bonds.
- C. faster because organic particles are ions.
- D. faster because inorganic particles contain both ionic and covalent bonds.

The correct answer is option [D].

Most organic compounds contain covalent bonds. Covalent or shared bonds are hard to break so many organic reactions proceed slowly.

67. An undesirable paraffin in the petroleum industry which is particularly prone to knocking is _____

- A. iso-octane.
- B. n-heptane.
- C. iso-heptane.
- D. n-octane.

The correct answer is option [B].

68. which pair of hydrocarbons does each compound contain only one double bond per molecule?

- A. C_2H_2 and C_2H_6 .
- B. C_2H_2 and C_3H_6
- C. C_4H_8 and C_2H_4 .
- D. C_6H_6 and C_7H_8 .

The correct answer is option [C].

Hydrocarbons with one double bond are alkenes, general formula C_nH_{2n} or twice as many hydrogen atoms as carbon atoms. Option C is the only pair with both hydrocarbons having twice as many hydrogen.

69. Cellulose, starch, proteins, and rubber are _____
- A. polymers of the same monomers, C, H, and O.
 - B. polymeric macromolecules.
 - C. polymeric micromolecules.
 - D. copolymers of glucose, amino acids, and isoprene.

The correct answer is option [B].

70. The IUPAC name of $C_2H_5COOC_2H_5$ is _____

- A. ethylethanoate.
- B. ethylpropanoate.
- C. propylethanoate.
- D. propylpropanoate.

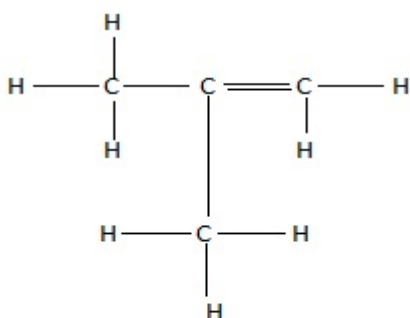
The correct answer is option [B].

71. Ethanoic acid is _____

- A. tribasic.
- B. monobasic.
- C. unionizable.
- D. dibasic.

The correct answer is option [B].

72. What is the IUPAC name of the compound with this structure?



- A. 2-methyl butane.
- B. 2-methyl prop-2-ene.
- C. 2-methyl prop-1-ene.
- D. but-1-ene.

The correct answer is option [B].

73. Which of these compounds will react with NaOH to form a salt?

- A. $\text{CH}_3\text{CH}_2\text{COOH}$.
- B. $(\text{CH}_3)_3\text{COH}$.
- C. $\text{CH}_3\text{CH} = \text{CH}_2$.
- D. $\text{C}_6\text{H}_{12}\text{O}_6$.

The correct answer is option [A].

74. Which of the following carbohydrates do not occur in crystalline form?

- A. Fructose
- B. Glucose
- C. Sucrose
- D. Cellulose

The correct answer is option [D].

75. How many carbon atoms are there in a benzene ring?

- A. 4.
- B. 5.
- C. 6.
- D. 7.

The correct answer is option [C].

76. Which of the following substances is not obtained during the destructive distillation of coal?

- A. Pyroligneous acid.
- B. Coal tar.
- C. Ammoniacal liquor.
- D. Coal gas.

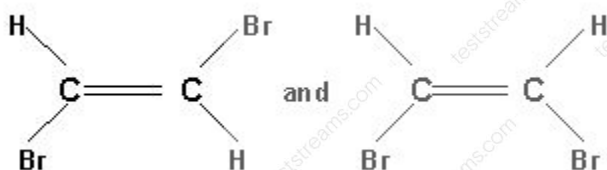
The correct answer is option [A].

77. If an element R belongs to the same group as sodium, an aqueous solution of ROH will _____

- A. be neutral.
- B. be acidic.
- C. be coloured.
- D. have pH greater than 7.

The correct answer is option [D]. ROH is an Alkali. Destructive distillation of coal, is the heating of coal in the absence of air.

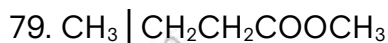
78. What is the relationship between the components represented by the following structures?



- A. They are allotropes.
- B. They are dimers.
- C. They are polymers.
- D. They are geometric isomers.

The correct answer is option [D].

Isomeric compounds have the same molecular formula but different structures.

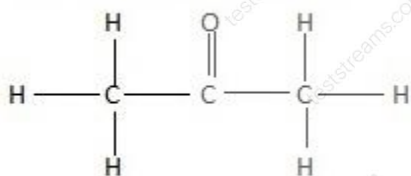


The IUPAC name for the compound above is _____

- A. ethoxymethane.
- B. methoxyethane.
- C. propylmethanoate.
- D. methylbutanoate.

The correct answer is option [D].

80. Consider the following compound



The compound with the structure above is an _____

- A. alkanal.
- B. alkanone.
- C. alkanoate.
- D. alkanonic acid.

The correct answer is option [B].

81. 2-methylprop-1-ene is an isomer of _____

- A. but-2-ene.
- B. 2-methylbut-2-ene.
- C. pent-1-ene.
- D. 2-methylbut-1-ene.

The correct answer is option [A].

82. Which of the following mixtures are produced when high boiling point petroleum fractions are cracked for an increased yield of gasoline?

- A. Alkanes.

- B. Alkanes and alkenes.
- C. Alkanes and alkynes.
- D. Alkenes.

The correct answer is option [B].

83. Which of the following substances give a brick red precipitate when heated with Fehlings solution?

- A. Alkanoates.
- B. Carbohydrates.
- C. Fats and Oils.
- D. Proteins.

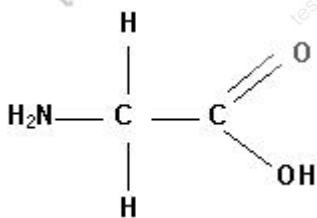
The correct answer is option [B].

84. An example of a secondary amine is _____

- A. propylene.
- B. methylamine.
- C. di-butyl amine.
- D. trimethylamine.

The correct answer is option [C].

85. The two functional groups in the compound given are _____ and _____



- A. alcohol and amine.
- B. acid and amine.
- C. aldehyde and acid.

D. acid and base.

The correct answer is option [B].

86. Dehydration of ethanol produces a gas X which has a general molecular formula,

A. $(\text{CH}_2)_n$.

B. C_nH_{2n} .

C. $\text{C}_n\text{H}_{2n-2}$.

D. $\text{C}_n\text{H}_{2n+1}$.

The correct answer is option [B].

87. What is the maximum number of covalent bonds that an atom of carbon can form?

A. 1

B. 2

C. 3

D. 4

The correct answer is option [D]. Because carbon has 4 valence electrons, it can form 4 shared (covalent) bonds.

88. An acid present in protein is called _____.

A. lactic acid

B. amino acid

C. propanoic acid

D. palmitic acid

The correct answer is option [B].

89. In a molecule of CH_4 , the hydrogen atoms are spatially oriented towards the centres of a regular _____ -

- A. pyramid.
- B. tetrahedron.
- C. square.
- D. rectangle.

The correct answer is option [B]. Organic compounds are three dimensional and CH_4 has 4 equivalent single bonds. Tetra means 4.

90. Which of the following hydrocarbons is unsaturated?

- A. Ethane.
- B. Benzene.
- C. 2-methyl butane.
- D. 2,2,4 - bimethyl pentane.

The correct answer is option [B]. Benzene consists of double bonds.

91. A homologous series is one in which _____.

- i. all the components can be represented by one general formula
- ii. successive members differ from one another by CH_2
- iii. physical properties differ only in terms of the number of carbon atoms per molecule

- A. i and ii only
- B. ii only
- C. i and iii only
- D. i, ii, & iii

The correct answer is option [D].

TOPIC: OXYGEN. OXIDES. HYDROGEN PEROXIDES. OZONE

DIRECTION: Choose the correct options from the lettered options.

1. Which of these gases in the options below, has the following physical properties?

(i) Pale blue syrup liquid.

(ii) Dissolves in water to give a very weak acidic solution.

(iii) Boils, with decomposition, at 150°C and freezes at about -0.9°C.

A. O₂

B. H₂O₂

C. H₂

D. N₂

The correct answer is option [B]

2. Oxygen is prepared in the laboratory by _____, _____ and _____.

A. reaction of potassium trioxochlorate (V) with hydrogen peroxide and oxidation of hydrogen peroxide

B. decomposition of potassium trioxochlorate (V), hydrogen peroxide and reduction of hydrogen peroxide

C. decomposition of potassium trioxochlorate (IV), hydrogen peroxide and oxidation of hydrogen peroxide

D. decomposition of potassium trioxochlorate (V), hydrogen peroxide and oxidation of hydrogen peroxide

The correct answer is option [D]

3. Which of the following are industrial preparation of oxygen?

(i) Liquefaction of air

(ii) Fractional distillation of the resultant liquid air

(iii) Oxidation of hydrogen peroxide

A. (i), (ii), (iii)

B. (ii) & (iii) only

C. (i) & (ii) only

D. (i) only

The correct answer is option [C]

4. The following are uses of hydrogen peroxide except _____.

A. used as an antiseptic

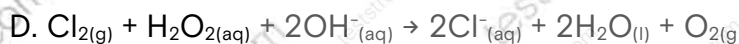
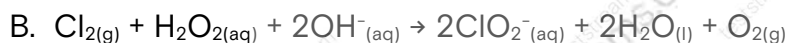
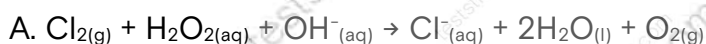
B. used in bleaching delicate materials

C. used for burning diesel oil in engines of submerged submarines

D. used in ventilating stuffy chambers

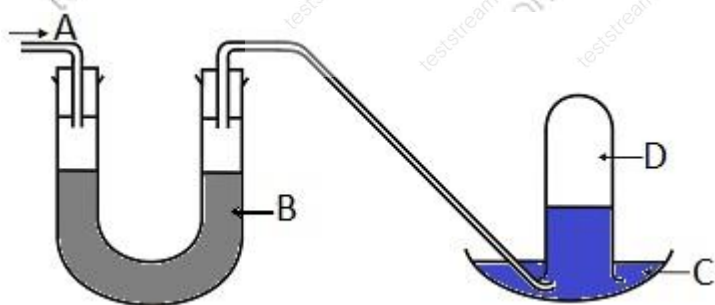
The correct answer is option [D]

5. Hydrogen peroxide can be oxidized by chlorine. What is the equation for the reaction?



The correct answer is option [D]

6. From the diagram drawn the part labelled A is _____.



A. oxygen

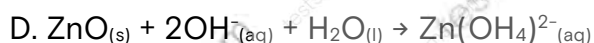
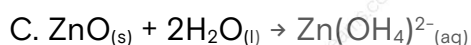
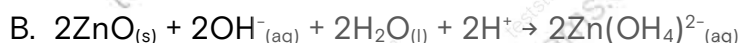
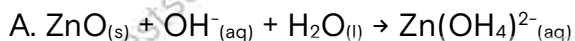
B. hydrogen

C. calcium chloride

D. sulphur

The correct answer is option [A]

7. Zinc oxide, ZnO is amphoteric. It dissolves in alkali to give the ion $\text{Zn}(\text{OH})_4^{2-}$, what is the equation for the reaction?



The correct answer is option [D]

8. Why does reactive metals like sodium not react with liquid oxygen?

A. At the temperature of liquid oxygen (less than 90K) the sodium and oxygen have sufficient energy to get over the energy barrier.

B. At the temperature of liquid oxygen (more than 90K) the sodium and oxygen have insufficient energy to get over the energy barrier.

C. At the temperature of liquid oxygen (less than 90K) the sodium and oxygen have insufficient energy to get over the energy barrier.

D. At the temperature of liquid oxygen (more than 90K) the sodium and oxygen have sufficient energy to get over the energy barrier.

The correct answer is option [C]

9. Which of the following are tests for oxygen?

(i) Odourless

(ii) Slightly soluble

(iii) Produces reddish brown fumes of nitrogen (IV) oxide

(iv) Residual gas

A. (i) & (iv) only

- B. (i), (ii), (iii)
- C. (ii), (iii), (iv)
- D. (ii) & (iv) only

The correct answer is option [B]

10. The industrial preparation of oxygen from air is by _____

- A. condensation.
- B. crystallization.
- C. distillation.
- D. fractional distillation.

The correct answer is option [D].

11. Hydrogen peroxide can be oxidized by chlorine. What ion does chlorine turn into when it has been reduced?

- A. Chlorate (ClO_3^-) ion
- B. Chloride (Cl^-) ion
- C. Chlorine (Cl_2) ion
- D. Chlorate (ClO_2^-) ion

The correct answer is option [B]

12. Which of the following is an allotropic form of oxygen?

- A. H_2O_2 .
- B. HgO .
- C. NO_2 .
- D. O_3 .

The correct answer is option [D].

13. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. What mass of oxygen was combined with the sodium?

- A. 1.50g
- B. 1.15g
- C. 1.60g
- D. 2.75g

The correct answer is option [C]

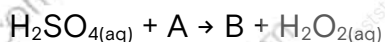
14. What is the value of A in the reaction given below?



- A. BaSO_4
- B. H_2O
- C. BaSO_3
- D. H_2O_2

The correct answer is option [A]

15. The reaction below is the laboratory preparation of hydrogen peroxide;



What is the value of A?

- A. $\text{BaO}(\text{s})$
- B. $\text{BaO}_2(\text{s})$
- C. $\text{BaSO}_3(\text{s})$
- D. $\text{BaSO}_4(\text{s})$

The correct answer is option [B]

16. Which of the following are types of oxide?

- (i) Acidic oxide
- (ii) Basic oxide

(iii) Amphoteric oxide

(iv) Neutral oxide

A. (i), (ii), (iii)

B. (i) & (ii)

C. (i), (ii), (iii), (iv)

D. (ii) only

The correct answer is option [C]

17. Which of the gases in the options below, has the following physical properties?

(i) Pale-blue gas

(ii) Smells like dilute chlorine

(iii) Poisonous at concentration above 100 parts per million.

(iv) Slightly soluble in water but dissolves in turpentine.

A. hydrogen sulphide

B. oxygen

C. hydrogen

D. ozone

The correct answer is option [D]

18. Which of these gases has the following physical properties?

(i) Diatomic gas

(ii) Colourless, tasteless and odourless

(iii) Slightly soluble in water

(iv) Liquefies easily

A. CO

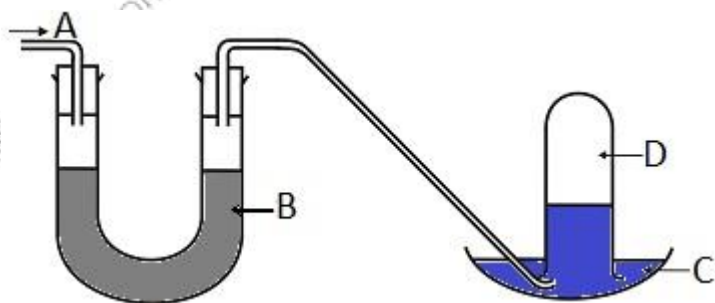
B. O₂

C. N₂

D. H₂

The correct answer is option [B]

19. From the diagram draw the part labelled B is _____.



- A. anhydrous calcium hydroxide and concentrated tetraoxosulphate (VI) acid
- B. anhydrous calcium chloride and dilute tetraoxosulphate (VI) acid
- C. anhydrous calcium chloride and concentrated tetraoxosulphate (VI) acid
- D. anhydrous calcium chloride and dilute tetraoxosulphate (VI) acid

The correct answer is option [C]

20. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. What is the ratio of the moles of the elements?

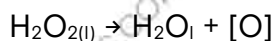
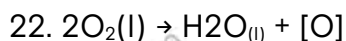
- A. 2 moles oxygen to 1 mole sodium
- B. 1 mole oxygen to 2 moles sodium
- C. 1 mole oxygen to 0.7 moles sodium
- D. 0.5 moles oxygen to 1 mole sodium

The correct answer is option [A]

21. Zinc oxide, ZnO, is amphoteric. It dissolves in alkali to give the ion $\text{Zn}(\text{OH})_4^{2-}$. What is the equation for the reaction of the oxide with hydrogen ions?

- A. $\text{ZnO}_{(s)} + 2\text{H}^+_{(aq)} \rightarrow \text{Zn}^{2+}_{(aq)} + \text{H}_2\text{O}_{(l)}$
- B. $\text{ZnO}_{(s)} + \text{H}^+_{(aq)} \rightarrow \text{Zn}^{2+}_{(aq)} + \text{H}_2\text{O}_{(l)}$
- C. $\text{Zn}^{2+}_{(aq)} + 2\text{H}^+_{(aq)} \rightarrow \text{ZnO}_{(s)} + \text{H}_2\text{O}_{(l)}$
- D. $\text{Zn}^{2+}_{(aq)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{ZnO}_{(s)} + 2\text{H}^+_{(aq)}$

The correct answer is option [A]



In the reaction given above, hydrogen peroxide is acting as _____.

- A. hydrating agent
- B. oxidizing agent
- C. reducing agent
- D. drying agent

The correct answer is option [B]

23. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. How many moles of oxygen atom is involved in the reaction?

- A. 0.094 mol
- B. 0.100 mol
- C. 0.072 mol
- D. 0.172 mol

The correct answer is option [B]

24. In the laboratory, ozone can be made by _____.

- A. passing oxygen over nickel catalyst
- B. passing oxygen through a strong electric field
- C. passing oxygen over potassium chlorate
- D. passing oxygen through liquefied air

The correct answer is option [B]

25. Pure ozone can be obtained as a blue liquid by _____.

- A. cooling ozonized oxygen to -102°C
- B. cooling ozonized oxygen to -112°C

- C. passing electric discharge to ozonized oxygen
- D. passing ozonized oxygen through calcium oxide

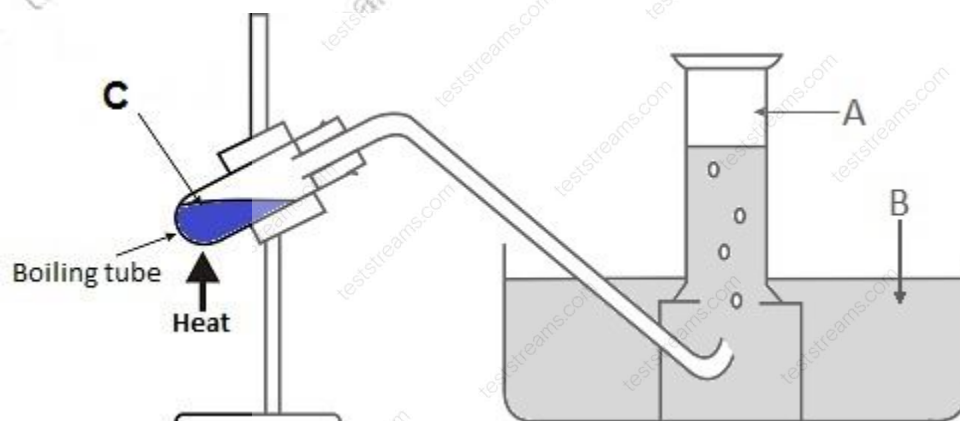
The correct answer is option [B]

26. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. How many moles of sodium were used?

- A. 0.0696 mol
- B. 0.0652 mol
- C. 0.0500 mol
- D. 0.0120 mol

The correct answer is option [C]

27. From the diagram drawn the part labelled C is _____.



- A. hydrogen peroxide + manganes (IV) oxide
- B. potassium trioxochlorate (V) + manganes (IV) oxide
- C. hydrogen peroxide + manganes (IV) oxide
- D. potassium trioxochlorate (III) + manganes (IV) oxide

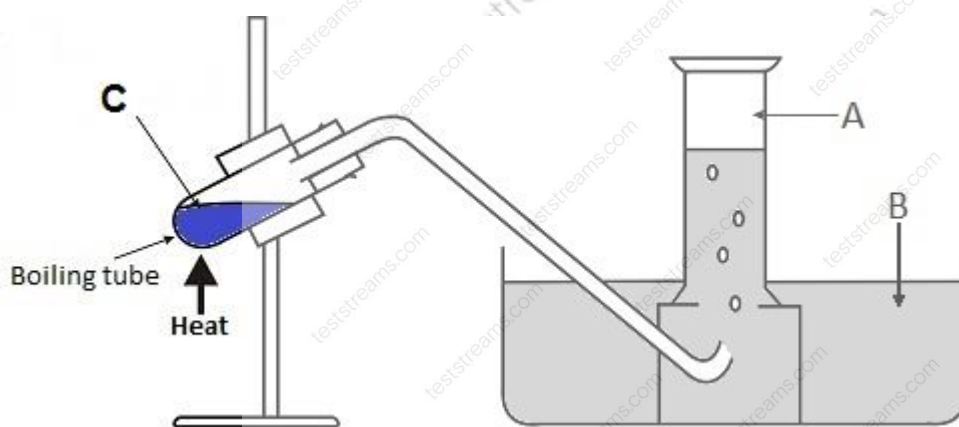
The correct answer is option [B]

28. Which gas is obtained by cooling ozonized oxygen to -112°C ?

- A. O_2
- B. O_3
- C. H_2
- D. N_2

The correct answer is option [B]

29. From the diagram drawn, the part labelled A is _____.



- A. water
- B. hydrochloric gas
- C. hydrogen peroxide
- D. oxygen

The correct answer is option [D]

30. Which of these gases has the following chemical characteristics?

- (i) Combines with other elements except rare gases
- (ii) Combines with some halogens
- (iii) Forms multiple bonds with itself

- A. CO
- B. N_2
- C. H_2

D. O₂

The correct answer is option [D]

31. Which of these gases in the options below, has the following chemical characteristics?

(i) Decomposes to form water and oxygen.

(ii) A strong oxidizing agent reacting with acidified potassium iodide to form iodine.

(iii) A reducing agent reacting with chlorine and silver oxide to produce hydrochloric acid and silver.

A. O₂

B. NO₂

C. H₂O₂

D. H₂

The correct answer is option [C]

32. Ozone, O₃, has a _____.

A. triangular shape

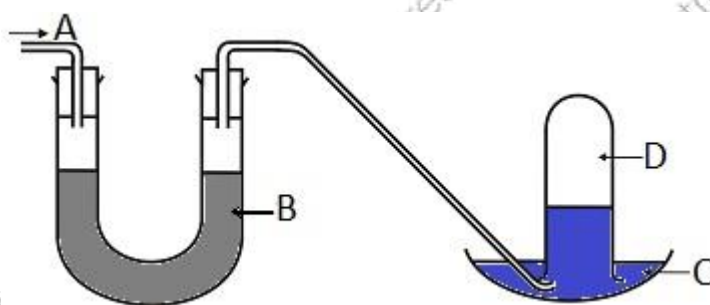
B. pyramidal shape

C. coplanar shape

D. linear shape

The correct answer is option [A]

33. From the diagram drawn the part labelled D is _____.



- A. dry oxygen
- B. dry hydrogen
- C. nitrogen oxide
- D. dry chlorine

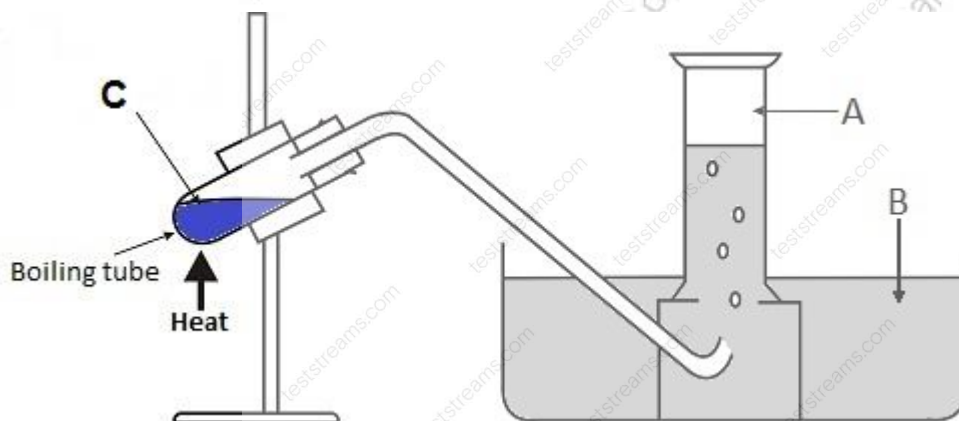
The correct answer is option [A]

34. 1.15g of sodium reacted with oxygen at a high pressure gives 2.75g of a white powder, sodium superoxide. What is the empirical formula of the compound?

- A. NaO
- B. Na₂O
- C. NaO₂
- D. NaO₄

The correct answer is option [C]

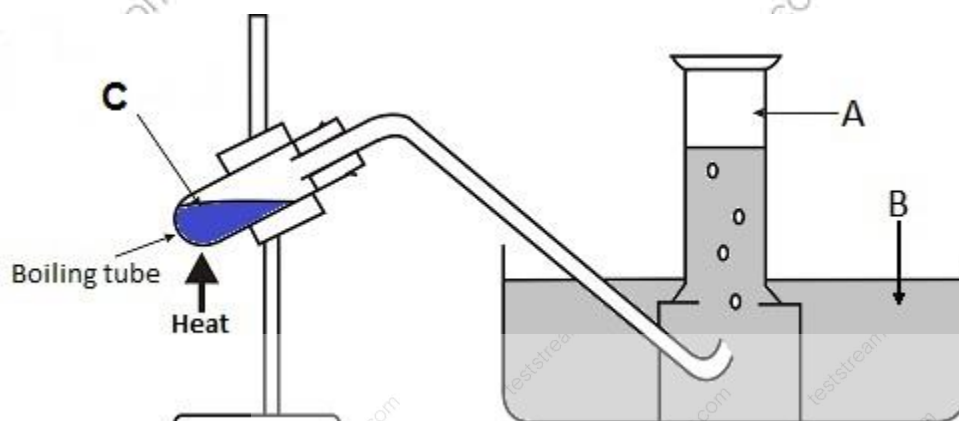
35. From the diagram drawn, the part labelled B is _____.



- A. water
- B. hydrogen peroxide
- C. hydrogen chloride
- D. dilute hydrogen nitrate

The correct answer is option [A]

36. The diagram drawn is an illustration of an experiment for the _____.



- A. preparation of oxygen from potassium trioxochlorate (III)
- B. preparation of oxygen from hydrogen peroxide
- C. preparation of oxygen from potassium trioxochlorate (IV)
- D. preparation of oxygen from potassium trioxochlorate (V)

The correct answer is option [D]

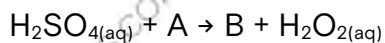
37. Which of the following are the uses of ozone?

- (i) Good bleaching agent
- (ii) Ventilating areas which get very little fresh air
- (iii) Disinfectant in water and sewage purification
- (iv) In air-conditioning plants

- A. (i), (ii), (iii)
- B. (i) & (ii) only
- C. (i), (ii), (iii) & (iv)
- D. (ii), (iii) & (iv) only

The correct answer is option [C]

38. The reaction below is the laboratory preparation of hydrogen peroxide;

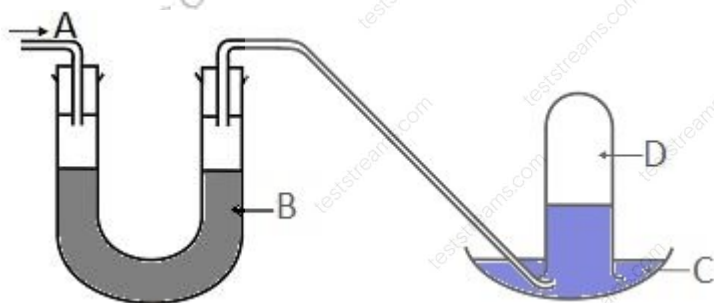


What is the value of B?

- A. $\text{BaSO}_3(\text{s})$
- B. $\text{BaSO}_4(\text{s})$
- C. $\text{BaO}(\text{s})$
- D. $\text{BaO}_2(\text{s})$

The correct answer is option [B]

39. From the diagram drawn the part labelled C is _____.



- A. mercury
- B. dilute hydrogen chloride
- C. water
- D. mercury oxide

The correct answer is option [A]

40. Oxygen in air can be absorbed by passing it through _____.

- A. caustic soda
- B. alkaline pyrogallol
- C. 95% ethanol
- D. washing soda

The correct answer is option [B]

TOPIC: PHOSPHORUS AND SILICON COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. Lime soda glass is made from the mixture of _____

- A. silicon, washing soda and limestone.
- B. metallic trioxosilicates (IV), silica and limestone.
- C. silica, caustic soda and limestone.
- D. silica, washing soda and limestone.

The correct answer is option [D].

2. $P_{4(s)} + 5O_{2(g)} \rightarrow$

The product of the given reaction above is _____

- A. $P_4O_{8(g)}$
- B. $P_4O_{6(g)}$
- C. $P_4O_{10(g)}$
- D. $P_4O_{12(g)}$

The correct answer is option [C].

3. When sodium trioxosilicate (IV) dissolves in hot water a viscous liquid is formed known as _____

- A. flint glass.
- B. silica gel.
- C. lime-soda glass.
- D. water-glass

The correct answer is option [D].

4. When an acid is added to a solution of water glass and heated to dehydration, _____ is formed.

- A. pyrex
- B. lime soda glass
- C. silica gel
- D. flint glass

The correct answer is option [C].

5. Silica gel is commonly used in packaging electronics because _____

- A. it extends the life of the integrated circuits in them.
- B. it keeps away rats and cockroaches.
- C. it is stable in porous packs.
- D. it is hygroscopic.

The correct answer is option [D].

6. Heating silicon in air forms _____

- A. trioxosilicates (IV).
- B. silicon.
- C. silicon (IV) oxide.
- D. silicon tetrachloride.

The correct answer is option [C].

7. Silicon (IV) oxide occurs naturally in three main crystalline forms except _____

- A. slate.
- B. quartz.
- C. tridymite.
- D. cristobalite.

The correct answer is option [A].

8. The reaction of heated silicon (IV) oxide and metallic salt forms _____

- A. trioxosilicates (IV) and liquid.
- B. metallic trioxosilicates (IV) and gas.
- C. metallic trioxosilicates (IV) and liquid.
- D. trioxosilicates (IV) and gas.

The correct answer is option [B].

9. Silicon (IV) oxide is used in the following except _____

- A. optical lenses and heat resistant apparatus.
- B. mortar, cement, concrete, glass and refractory silica bricks.
- C. making bronze and steel alloys.
- D. making dry antiseptic dressings.

The correct answer is option [C].

10. From the diagram drawn, the part labelled A is _____

- A. iron.
- B. lead.
- C. zinc.
- D. copper.

The correct answer is option [C].

11. An example of heat resistant glass is _____

- A. pyrex.
- B. lime soda glass.
- C. water glass.
- D. flint glass.

The correct answer is option [A].

12. The low ignition temperature of white phosphorus is _____

- A. 250°C.
- B. 100°C.
- C. 44°C.
- D. 35°C.

The correct answer is option [D].

13. Water glass is a _____

- A. solid.
- B. amorphous solid.
- C. viscous liquid.
- D. brittle cast.

The correct answer is option [C].

14. To improve the quality of glass _____ is added.

- A. metallic oxides and coke
- B. powdered glass and coke
- C. powdered glass and metallic trioxocarbonate (IV)
- D. silicon (IV) oxide and coke

The correct answer is option [B].

15. What is the chemical formula of phosphine?

- A. PH.
- B. P₂H₄.
- C. P₃H₆.
- D. PH₃.

The correct answer is option [D].

16. A little white phosphorus on a deflagrating spoon burns in chlorine to produce _____

- A. phosphorus trichloride.
- B. phosphorus pentachloride.
- C. a mixture of phosphorus trichloride and phosphorus pentachloride.
- D. phosphine.

The correct answer is option [A].

17. PCl_5 is formed when _____

- A. phosphorus reacts with limited supply of chlorine.
- B. phosphorus reacts with excess supply of chlorine.
- C. chlorine reacts with limited supply of phosphorus.
- D. all of the above.

The correct answer is option [B].

18. The tendency of phosphorus to glow in the dark is called _____

- A. fluorescence.
- B. efflorescence.
- C. phosphorescence.
- D. deliquescence

The correct answer is option [C].

19. White phosphorus is stored in the laboratory _____

- A. under paraffin oil.
- B. in a dessicator.
- C. under water.
- D. in the fume chamber.

The correct answer is option [C].

20. When a mixture of dry sand and magnesium powder is heated _____ is formed.

- A. silica
- B. trioxosilicate (V)
- C. silicon.
- D. amorphous silicon

The correct answer is option [D].

21. Which allotrope of phosphorus is not stable at room temperature?

- A. Black.
- B. Red.
- C. White.
- D. Green.

The correct answer is option [C].

22. The following options are allotropes of phosphorus except _____

- A. Green.
- B. White.
- C. Black.
- D. Red.

The correct answer is option [A].

23. Which compound has a characteristic smell like that of rotten fish?

- A. H_2S .
- B. NH_3 .
- C. CO_2 .
- D. PH_3 .

The correct answer is option [D].

24. Which phosphorus compound is used as a chlorinating agent and as a test for hydroxyl groups in straight-chain organic compounds?

- A. phosphorus (V) oxide.
- B. phosphorus (III) chloride.
- C. phosphorus (V) chloride.
- D. trioxophosphates (III).

The correct answer is option [C].

25. Silicon is found in the combined form as _____

- (i) Silicon (IV) oxide.
- (ii) Trioxosilicates (IV).
- (iii) Silicon tetrachloride.

- A. (ii) only.
- B. (i), (ii) and (iii).
- C. (iii) only.
- D. (i) and (ii).

The correct answer is option [D].

26. When white phosphorus reacts with dry chlorine in an inert atmosphere of dry carbon (IV) oxide, _____ is produced.

- A. P_4O_6
- B. PCl_5
- C. PCl_3
- D. P_4O_{10}

The correct answer is option [C].

27. Phosphorus (V) chloride is prepared by the _____

- A. action of dry chlorine on phosphorus (III) oxide.

- B. action of dry chlorine on phosphorus (III) chloride.
- C. action of dry chlorine on phosphorus (V) oxide.
- D. action of dry chlorine on phosphorus.

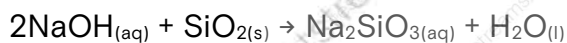
The correct answer is option [B].

28. Less pure crystalline silica is found in _____

- A. quartz.
- B. tridymite.
- C. jasper.
- D. cristobalite.

The correct answer is option [C].

29. From the equation of reaction given below;



silicon (IV) oxide is acting as a _____

- A. reducing agent.
- B. oxidizing agent.
- C. acidic oxide.
- D. drying agent.

The correct answer is option [C].

30. Crystalline silicon is manufactured by _____

- A. heating coke and limited sand in an electric furnace.
- B. heating coal and excess sand in an electric furnace.
- C. heating coke and excess sand in an electric furnace.
- D. heating coal and excess sand in a furnace.

The correct answer is option [C].

31. _____ is used in making enamels, matches and glazes for pottery.

- A. Phosphorus (III) chloride
- B. Trioxophosphate (III) acid and its salts
- C. Phosphorus (V) oxide
- D. Tetraoxophosphates (V) acid and its salts

The correct answer is option [D].

32. The solvent suitable for sulphur and phosphorus is _____

- A. benzene.
- B. carbon tetrachloride.
- C. carbon (IV) sulphide.
- D. methyl benzene.

The correct answer is option [C].

33. The purest form of silica is _____

- A. flint.
- B. opal.
- C. quartz.
- D. ZnSiO_3 .

The correct answer is option [C].

34. Which allotrope of phosphorus is insoluble in water and most common solvents?

- A. White.
- B. Black.
- C. Red.
- D. Green.

The correct answer is option [C].

35. The ignition temperature of white phosphorus is _____

- A. 100°C.
- B. 250°C.
- C. 35°C.
- D. 44°C.

The correct answer is option [B].

36. The allotrope of phosphorus with a macro molecule structure is _____

- A. red.
- B. green.
- C. black.
- D. white.

The correct answer is option [A].

37. Metallic trioxosilicates are found in the following except _____

- A. slate.
- B. granite.
- C. basalt.
- D. clay.

The correct answer is option [D].

38. Though carbon and silicon appear in the same group of the periodic table, they differ extensively from each other because _____

- A. silicon is a metalloid but carbon is not.
- B. carbon exhibits allotropy but silicon does not.
- C. silicon is volatile but carbon is not.
- D. silicon is more abundant in nature than carbon.

The correct answer is option [B].

39. When phosphorus reacts with copper (II) tetraoxosulphate (VI), it reduces to _____

- A. copper (I) oxide.
- B. copper.
- C. copper (II) oxide.
- D. copper (IV) oxide.

The correct answer is option [B].

40. Flint glass contains _____

- A. trioxosilicates (IV) of copper.
- B. trioxosilicates (IV) of zinc.
- C. trioxosilicates (IV) of lead.
- D. trioxosilicates (IV) of iron.

The correct answer is option [C].

41. Phosphorus used in making safety matches is red phosphorus because _____

- A. it is stable when mixed with oxidizing agents.
- B. it has low ignition temperature.
- C. it has low specific heat capacity.
- D. it has high ignition temperature.

The correct answer is option [B].

42. What is the oxidation state of phosphorus in the compound P_4O_6 ?

- A. -3.
- B. +3.
- C. +5.
- D. +2.

The correct answer is option [B].

Solution: The oxidation state of P4 is taken as x; $+4x + (-2 \times 6) = 0$

$$4x = 12$$

$$x = 12/4 = +3.$$

43. Sodium trioxosilicates (IV) is made by heating _____

- A. one part by mass of silicon (IV) oxide with one part by mass of sodium trioxocarbonate (IV).
- B. two parts by mass of silicon (IV) oxide with one part by mass of sodium trioxocarbonate (IV).
- C. two parts by mass of silicon (IV) oxide with two parts by mass of sodium trioxocarbonate (IV).
- D. one part by mass of silicon (IV) oxide with two parts by mass of sodium trioxocarbonate (IV).

The correct answer is option [B].

44. Solvent for silicon (IV) oxide is _____

- A. HF.
- B. CCl₄.
- C. CS₂.
- D. Benzene.

The correct answer is option [A].

45. The following are drying agents except _____

- A. P₄O₁₀.
- B. CaCl₂.
- C. silica gel.
- D. NaOH pellets.

The correct answer is option [D].

46. Which of the following are physical properties of silicon (IV) oxide?

- (i) It exist as a colourless crystalline solid when pure.
- (ii) Because of its structure, it is non-volatile and hard.
- (iii) It has a high melting poin.t
- (iv) When cooled forms fused silica which makes it very heat resistant and acid resistant.

A. (i), (ii) and (iv).

B. (i), (iii) and (iv).

C. (i), (ii) and (iii).

D. (i), (ii), (iii) and (iv).

The correct answer is option [D].

47. Which of the following are methods of preparing phosphine?

- (i) Reaction of white phosphorus and hot sodium hydroxide.
- (ii) Reaction of water on calcium phosphide.
- (iii) Reaction with red phosphorus and hot sodium hydroxide.
- (iv) Reaction of an acid on calcium phosphide.

A. (i), (ii) and (iv).

B. (ii), (iii) and (iv).

C. (iii) only.

D. (i), (ii), (iii) and (iv).

The correct answer is option [A].

48. Phosphorus is abundantly found in rock except _____

A. rock phosphate

B. rock phosphorite.

C. rock apatite.

D. rock jasper.

The correct answer is option [D].

49. When hot sodium hydroxide reacts with red phosphorus _____

- A. no reaction takes place.
- B. phosphorus (III) oxide is formed.
- C. phosphorus (III) chloride is formed.
- D. phosphine is formed.

The correct answer is option [A].

50. Silicon (Si) may be prepared in the laboratory from the following equations except _____

- A. pure dry sand + magnesium.
- B. silicon (IV) oxide + coke.
- C. silicon (IV) chloride + zinc.
- D. silicon (III) chloride + hydrogen.

The correct answer is option [D].

51. Silicon (IV) oxide is insoluble in the following substance except _____

- A. hexafluorosilicates (IV).
- B. water.
- C. H_2SO_4 .
- D. HNO_3 .

The correct answer is option [A].

52. White phosphorus is soluble in the following solvents except _____

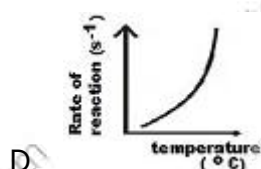
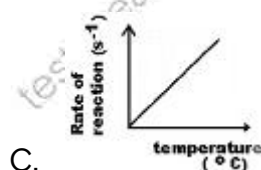
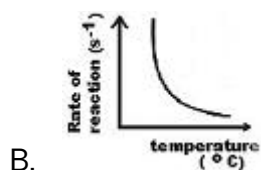
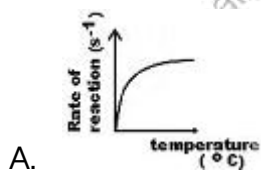
- A. carbon (IV) sulphide.
- B. benzene.
- C. organic solvents.
- D. water.

The correct answer is option [D].

TOPIC: RATE OF REACTIONS

DIRECTION: Choose the correct options from the lettered options.

1. Which of the diagram illustrates an increase in both the rate of reaction and temperature?



The correct answer is option [D]

2. Reaction occurs when the colliding reactant particles _____

- A. have energy less than the energy barrier.
- B. have energy equal or greater than the energy barrier.
- C. have energy less than effective collision.
- D. have energy greater than that of the products.

The correct answer is option [B].

3. Which of the following factors does not affect the rate of a chemical reaction between non-gaseous reactants?

- A. Concentration of reactants.
- B. Pressure.
- C. Temperature.
- D. Presence of a catalyst.

The correct answer is option [B].

4. What do we do to increase the surface area of the reactants?

- A. breaking them into chips.
- B. subjecting the reactants to high pressure.
- C. altering the direction of the reaction.
- D. using reactants of different densities.

The correct answer is option [A].

5. Two identical samples of calcium trioxocarbonate (IV) are placed in two beakers. 100cm³ of 1.0M hydrochloric acid are added to one, and 100cm³ of 5.0M hydrochloric acid are added to the other. All other conditions are the same.

Which of these is the same for the two cases?

- A. Molarity of chloride ions at any instant.
- B. Initial reaction rate.
- C. Time taken for the reaction to complete.
- D. Mass lost from the beakers on completion of reaction.

The correct answer is option [D].

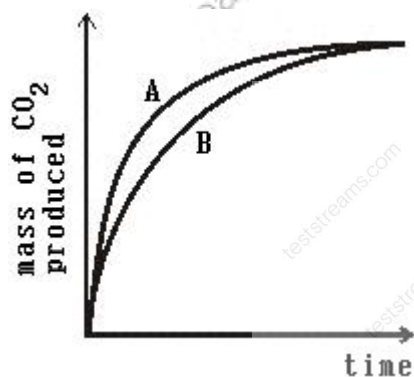
6. The minimum amount of energy required for effective collisions between reacting particles is known as _____

- A. activation energy.
- B. bond energy.

- C. kinetic energy.
- D. potential energy.

The correct answer is option [A].

7. The diagram drawn is an illustration to study the _____



- A. effect of pressure on reaction rate.
- B. effect of surface area of reactant on reaction rate.
- C. effect of catalyst on reaction rate.
- D. effect of concentration of reactant on reaction rate.

The correct answer is option [B].

8. The following are types of crystalline solids except _____ solids.

- A. covalent
- B. ionic
- C. molecular
- D. electronic

The correct answer is option [D].

9. The minimum energy that the reactants must have before they can change to products is known as _____

- A. chemical kinetics.
- B. kinetic energy.

C. activation energy.

D. reaction energy.

The correct answer is option [C].

10. Rates of chemical reactions are dependent on the _____

(i) concentration of reactants.

(ii) temperature of reactants.

(iii) presence or absence of a catalyst.

(iv) surface area of reactants.

A. (i) and (iii) only.

B. (i), (ii) and (iii) only.

C. (i) and (iv) only.

D. (i), (ii), (iii) and (iv).

The correct answer is option [D].

11. The equation given below;

$$k = A e^{-\frac{E_a}{RT}}$$

is called _____

A. Newton's equation.

B. Arrhenius equation.

C. Arrhenius factor.

D. Newman's equation.

The correct answer is option [B].

12. The factors that affect the rate of chemical reactions include _____

(I) concentration.

(II) temperature.

(III) presence of a catalyst.

(IV) collision frequency of particles.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

13. These are factors affecting chemical reaction except _____

- A. surface area.
- B. catalyst.
- C. nature of reactants.
- D. activation energy.

The correct answer is option [D].

14. Which of the following does not affect the rate of a chemical reaction?

- A. Concentration of the reactants
- B. Addition or presence of a catalyst
- C. Size of reacting particles
- D. The enthalpy change of the reaction

The correct answer is option [D].

15. The rate of chemical reaction of solids are not affected by _____

- A. catalyst.
- B. pressure.
- C. particle size.
- D. temperature.

The correct answer is option [B].

16. When there is an increase in concentration of the reactants there will be a corresponding _____

- A. decrease in the effective collisions of the reactants.
- B. no effective collisions of the reactants.
- C. increase in the effective collisions of the reactants.
- D. none of the above.

The correct answer is option [C].

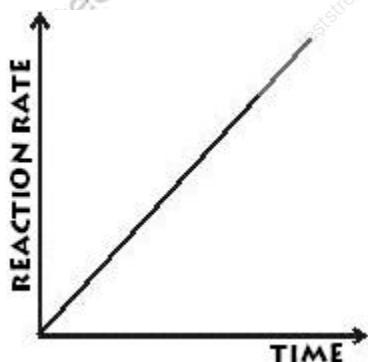
17. Which of the following statements are correct about equilibrium?

- (I) Chemical equilibrium is attained when the rates of forward and backward reactions are equal.
- (II) Changes in concentrations of reactants will alter equilibrium concentrations.
- (III) the rate of formation of the products decreases with time.
- (IV) all reactants have been used up.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

18. The reaction rate diagram signifies _____



- A. concentration against time.

- B. time against concentration.
- C. concentration against inverse of time.
- D. all of the above.

The correct answer is option [C].

19. The following methods are used to determine and measure the reaction rates except _____

- A. volume of a gaseous product.
- B. changes in intensity of colour.
- C. changes in pH
- D. increases in the mass of the reaction system as a result of addition of gaseous products.

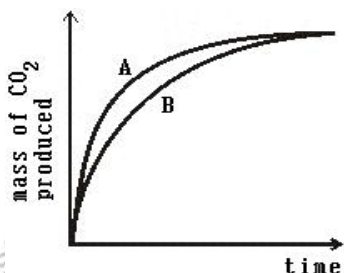
The correct answer is option [D].

20. What can prevent reactions from taking place?

- A. Collision of particles and the energy of the particles is zero to the activation energy.
- B. There is no collision of the particles and the energy of the particles is greater than the activation energy.
- C. The energy of the particles being less than the activation energy and there is no collision of the particles.
- D. The energy of the particles being greater than or equal to the activation energy and there is collision of the particles.

The correct answer is option [D].

21. The diagram drawn, the part labelled B is _____



- A. powdered marble.
- B. dust marble.
- C. marble chips.
- D. all of the above.

The correct answer is option [C].

22. Temperature affects rate of reaction except _____

- A. it increases the frequency of collision.
- B. it burns the reactants with reckless heating.
- C. it increases the kinetic energies of the reactant.
- D. the number of effective collisions of the reactants.

The correct answer is option [B].

23. When at equilibrium, which of the reactions below will shift to the right if the pressure is kept constant?

- A. $2\text{NO}_{(g)} \rightarrow \text{N}_{2(g)} + \text{O}_{2(g)}$.
- B. $2\text{SO}_{3(g)} \rightarrow 2\text{SO}_{2(g)} + \text{O}_{2(g)}$.
- C. $2\text{CO}_{2(g)} \rightarrow 2\text{CO}_{(g)} + \text{O}_{2(g)}$.
- D. $2\text{H}_{2(g)} \rightarrow 2\text{H}_2\text{O}_{(g)}$.

The correct answer is option [D].

24. **In the reaction given below;**



Why was finely divided iron used as a catalyst?

- A. To increase the forward reaction.
- B. To reduce the energy barrier.
- C. To increase the surface area of reactants.
- D. None of the above.

The correct answer is option [C].

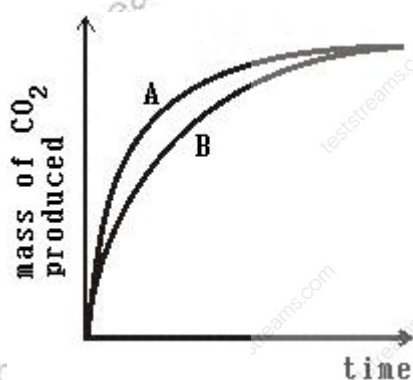
25. The rate curve is used to determine _____

- (i) average rate of reaction.
- (ii) rate at a particular instant during the reaction.
- (iii) the loss in the mass of the reaction system.

- A. (i) only.
- B. (i) and (ii) only.
- C. (i), (ii) and (iii).
- D. (iii) only.

The correct answer is option [B].

26. The diagram drawn, the part labelled A is _____



- A. marble chips.
- B. powdered marble.
- C. granule marble.
- D. none of the above.

The correct answer is option [B].

27. The following are factors that affect rates of reaction except _____

- A. Activation energy.
- B. Surface area of reactants.
- C. Presence of catalyst.

D. Concentration of reactants.

The correct answer is option [A].

28. Catalysts _____

A. increase the equilibrium constants of reactants.

B. bring about the energy barrier of reaction.

C. lower the activation energy of reaction.

D. surmount the energy barrier of reaction.

The correct answer is option [C].

29. Which of the following is not true of a catalyst?

A. A catalyst will lower the activation energy for a reaction.

B. A catalyst is used up when it catalyzes a reaction.

C. A catalyst will speed up the rate of a reaction.

D. A catalyst is not used up when it catalyzes a reaction..

The correct answer is option [B].

30. The unit of rate of chemical reaction is _____

A. $\text{mol dm}^{-3} \text{s}^{-1}$.

B. $\text{mol}^{-1} \text{s}^{-1}$.

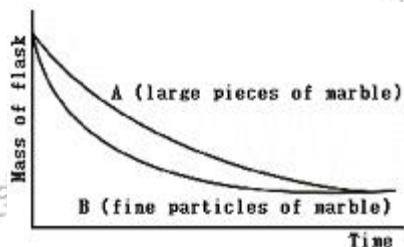
C. mol^{-1} .

D. s mol^{-1} .

The correct answer is option [A].

31. Two flasks, A and B, contain equal weights of coarse and fine marble respectively. 40 cm³ of 2M hydrochloric acid is added to each flask and the flasks are weighed every minute. The different weights are plotted against the time from the start of the experiment. The results are shown in the diagram drawn.

The experiments illustrates the effect of _____



- A. surface area on the reaction rate.
- B. temperature on the reaction rate.
- C. catalysis on the reaction rate.
- D. concentration on the reaction rate.

The correct answer is option [A].

32. What factor is responsible for the following reactions?

- (i) Decomposition of H_2O_2 .
- (ii) Reaction between methane and chlorine.
- (iii) Conversion of silver halides to grey metallic silver.

- A. Decomposition.
- B. Light.
- C. Concentrators.
- D. Catalyst.

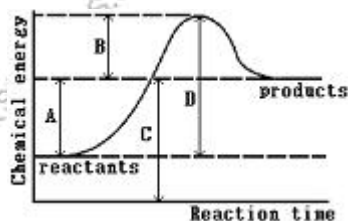
The correct answer is option [B].

33. The minimum or critical amount of energy required before a chemical reaction could occur is called _____

- A. reaction energy.
- B. effective collision.
- C. activation energy.
- D. activated complex.

The correct answer is option [C].

34. The graph drawn gives the energy profile of a reacting system. Which of the energies represents the activation energy of the reaction?



- A. A.
- B. B.
- C. C.
- D. D.

The correct answer is option [B].

35. "The rate of a reaction is proportional to the number of effective collisions occurring per second between the reactants."

This statement is associated with the _____

- A. kinetic theory.
- B. atomic theory.
- C. collision theory.
- D. gas laws.

The correct answer is option [C].

36. If 2 g of zinc granules was reacted with excess dilute HCl to evolve hydrogen gas which came to completion after 5 minutes. Calculate the rate of the chemical reaction in g hr⁻¹.

- A. 48 g hr⁻¹.
- B. 12 g hr⁻¹.
- C. 24 g hr⁻¹.
- D. 240 g hr⁻¹.

The correct answer is option [C].

Solution: Rate of reaction is given as mass of zinc/time, where mass of zinc = 2g, time = 5 minutes =

$\frac{1}{12}$ hr. Therefore, rate of reaction = $\frac{2}{1/12} = 2 \times 12 = 24 \text{ g hr}^{-1}$.

37. Rate of chemical reaction depends on the following factors except _____

- A. rate at which gas is evolved.
- B. rate at which products are formed.
- C. rate at which the colour of reactions change.
- D. rate at which the reactants diminish.

The correct answer is option [C].

38. What is the rate of reaction?

- A. It is the change in concentration of reactant or product per unit time.
- B. It is the change in concentration of reactant or product.
- C. It is the number of moles of reactant converted or product formed.
- D. It is the product of time and the number moles of reactant converted or product formed.

The correct answer is option [A].

39. When a diluted solution of "20-volume" hydrogen peroxide solution was heated, the total volume of oxygen collected was 105 cm³ in just 35 minutes. What was the rate of formation of oxygen?

- A. 3 cm⁻³ min⁻².
- B. 3 cm³ min⁻¹.
- C. 60 cm⁻³ min⁻².
- D. 60cm³ min⁻¹.

The correct answer is option [B].

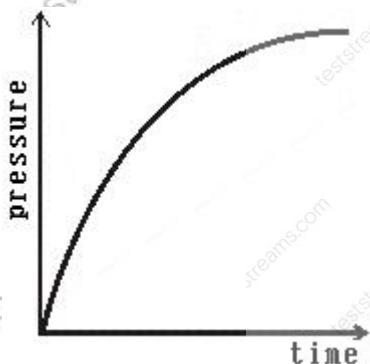
40. Which of the following statement(s) is/are correct about catalysts?

- (I) They alter the rate of chemical reactions.
- (II) They are generally specific in action.
- (III) They remain unchanged chemically at the end of the reaction.
- (IV) They starts the reaction.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [C].

41. The diagram drawn is a _____



- A. reaction rate curve.
- B. equilibrium curve.
- C. chemical kinetics curve.
- D. pH curve.

The correct answer is option [A].

42. Which of the following statements in the options is incorrect?

Rates of chemical reaction can be altered by the _____

- A. amount of catalyst used.
- B. concentration of the reactants.

- C. volume of reactants in the solution.
- D. surface area of solid reactants.

The correct answer is option [C].

43. For most irreversible reactions, _____

- A. the reaction rate increases with time.
- B. the reaction rate decreases with time.
- C. the rate stabilizes with time.
- D. the rate produces a curve with time.

The correct answer is option [B].

44. Equilibrium is said to be attained in a reversible reaction when _____.

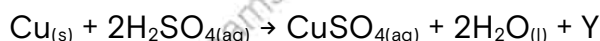
- A. all the reactants have been used up
- B. all the products have been used up
- C. there is no further change in temperature
- D. the rates of the forward and backward reactions are equal

The correct answer is option [D].

TOPIC: SULPHUR AND ITS COMPOUNDS

DIRECTION: Choose the correct options from the lettered options.

1. What is the name of product Y in the following reaction?



- A. Copper (II) hydroxide.
- B. Hydrogen sulphide.
- C. Sulphur (VI) oxide.
- D. Sulphur (IV) oxide.

The correct answer is option [D].

2. Powdered sulphur is heated to its boiling point and then poured into cold water. The product is an elastic ribbon-like substance, which is insoluble in carbon disulphide and called _____

- A. rhombic sulphur.
- B. flowers of sulphur.
- C. plastic sulphur.
- D. monoclinic sulphur.

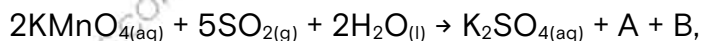
The correct answer is option [C].

3. The reaction of concentrated tetraoxosulphate (VI) acid with metals produces _____

- A. metallic tetraoxosulphate (VI), water and hydrogen.
- B. metallic tetraoxosulphate (VI) and hydrogen.
- C. metallic tetraoxosulphate (VI), water and sulphur (IV) oxide.
- D. metallic tetraoxosulphate (VI) and sulphur (IV) oxide.

The correct answer is option [C].

4. From the equation of reaction given below,



Sulphur (IV) oxide is acting as a _____

- A. drying agent.
- B. reducing agent.
- C. oxidizing agent.
- D. dehydrating agent.

The correct answer is option [B].

5. Which of the following physical properties of hydrogen sulphide are correct?

- (i) It is moderately soluble in water.
- (ii) It is very poisonous.
- (iii) It burns with a pale blue flame.
- (iv) It is less dense than air.

- A. (i), (ii), and (iv).
- B. (i), (ii), (iii) and (iv).
- C. (i), (ii) and (iii).
- D. (ii), (iii) and (iv).

The correct answer is option [C].

6. Concentrated tetraoxosulphate (VI) acid is a dehydrating agent when it _____

- A. removes the elements of hydrogen and oxygen in the form of water from compounds.
- B. donates electrons to oxidizing agents.
- C. accepts electrons from reducing agents.
- D. removes the elements of oxygen from compounds.

The correct answer is option [A].

7. To test for trioxosulphates (IV) ____ is used, with a dilute acid and ____ is evolved/deposited.

- A. barium trioxonitrate and sulphur (IV) oxide
- B. barium trioxocarbonate and sulphur (IV) oxide
- C. barium trioxonitrate and sulphur
- D. barium trioxonitrate and hydrogen sulphide

The correct answer is option [A].

8. Excess sulphur reacts with hot concentrated NaOH solution to form _____

- A. sodium sulphide + sodium trioxosulphate (IV).
- B. sodium sulphide + sodium tetraoxosulphate (VI).
- C. sodium polysulphide + sodium trioxothiosulphate (IV).
- D. sodium polysulphide + sodium tetraoxosulphate (VI).

The correct answer is option [B].

9. Extraction of sulphur from the earth's crust is by one of these processes.

- A. Solvay process.
- B. Contact process.
- C. Frasch process.
- D. Kiln process.

The correct answer is option [C].

10. To test for tetraoxosulphates (VI) ____ is used.

- A. acidified barium chloride
- B. acidified barium trioxocarbonate
- C. acidified barium hydroxide
- D. acidified barium trioxonitrate

The correct answer is option [A].

11. Both hydrogen sulphide and sulphur (IV) oxide decolorize acidified potassium tetraoxomanganate (VII), but hydrogen sulphide produces _____

- A. tetraoxosulphate (VI) acid.
- B. sulphur (IV) oxide.
- C. a precipitate of sulphur.
- D. hydrogen gas.

The correct answer is option [C].

12. The property of sulphur used in its extraction by the Frasch process is its _____

- A. low melting point.
- B. unstable nature.
- C. allotropic nature.
- D. non-metallic nature.

The correct answer is option [A].

13. Sulphur (IV) oxide is used for the following except _____

- A. germicide and fumigant.
- B. refrigerant.
- C. preserving liquids like orange juice.
- D. used for restoring ozone layer.

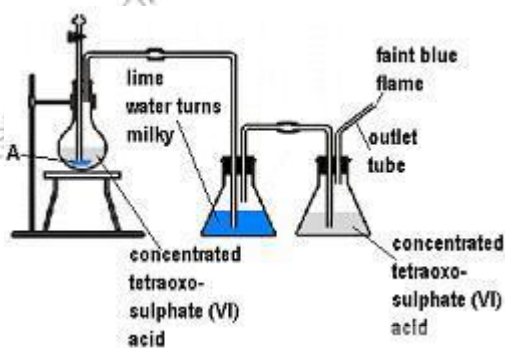
The correct answer is option [D].

14. Sulphur (IV) oxide bleaches by _____

- A. oxidation.
- B. reduction.
- C. decomposition.
- D. carboxylation.

The correct answer is option [B].

15. The diagram drawn is an illustration of an experiment used to _____



- A. prepare metallic tetraoxosulphates.
- B. study the dehydrating action of concentrated tetraoxosulphate (VI) acid on ethanedioic acid.
- C. study the reducing action of concentrated tetraoxosulphate (VI) acid on compounds.
- D. study the oxidizing action of concentrated tetraoxosulphate (VI) acid on compounds.

The correct answer is option [B].

16. The following are allotropes of sulphur except _____

- A. white.
- B. rhombic.
- C. prismatic.
- D. amorphous.

The correct answer is option [A].

17. Metallic sulphides which do not react with hydrochloric acid are fused with _____

- A. sodium trioxosulphate (IV).
- B. sodium tetraoxosulphate (VI).
- C. sodium trioxocarbonate (IV).
- D. sodium hydroxide.

The correct answer is option [C].

18. Metallic sulphide is prepared by the following except _____

- A. neutralization.
- B. direct heating.
- C. direct combination.
- D. precipitation.

The correct answer is option [B].

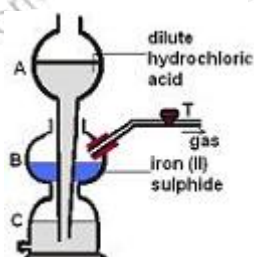
19. From the equation of reaction given below;
 $2\text{KMnO}_{4(\text{aq})} + 5\text{SO}_{2(\text{g})} + 2\text{H}_2\text{O}_{(\text{l})} \rightarrow \text{K}_2\text{SO}_{4(\text{aq})} + \text{A} + \text{B}$,

What is the product A?

- A. $2\text{H}_2\text{SO}_{4(\text{aq})}$.
- B. $\text{MnSO}_{4(\text{aq})}$.
- C. $2\text{MnSO}_{4(\text{aq})}$.
- D. $\text{H}_2\text{SO}_{4(\text{aq})}$.

The correct answer is option [C].

20. The diagram drawn is used to produce _____



- A. hydrogen sulphide.
- B. carbon (IV) oxide.
- C. sulphur.
- D. carbon (II) oxide.

The correct answer is option [A].

21. The addition of concentrated hydrochloric acid to sodium trioxosulphate (IV) is to prepare _____

- A. sulphur (IV) oxide.
- B. sulphur (VI) oxide.
- C. trioxosulphate (IV) acid.
- D. tetraoxosulphate (VI) acid.

The correct answer is option [C].

22. Sulphur reacts with many metals when heated in the absence of air, which of the options does sulphur reacts without heating?

- A. Fe.
- B. Zn.
- C. Na.
- D. Au.

The correct answer is option [C].

23. Which of the following is a physical property of trioxosulphate (IV) acid?

- (i) Colourless and unstable.
- (ii) It smells strongly of sulphur (IV) oxide.
- (iii) It turns red litmus blue.

- A. (i) only.
- B. (i), (ii) and (iii).
- C. (i) and (ii).
- D. (ii) and (iii).

The correct answer is option [C].

24. Which allotrope of sulphur is stable at low temperature?

- A. Rhombic.

- B. Prismatic.
- C. Amorphous.
- D. Monoclinic

The correct answer is option [A].

25. To test for sulphur (IV) oxide, the reagents used is _____

- A. potassium heptaoxochromate (VI) or sodium tetraoxomanganate (VII).
- B. acidified potassium heptaoxochromate (VI) or potassium tetraoxosulphate (VI).
- C. acidified potassium heptaoxochromate (VI) or potassium tetraoxomanganate (VI).
- D. acidified potassium heptaoxochromate (VI) or potassium tetraoxomanganate (VI).

The correct answer is option [D].

26. All sulphides are black except _____

- A. PbS.
- B. ZnS.
- C. HgS.
- D. FeS.

The correct answer is option [B].

27. Which of the following are uses of sulphur?

- (i) For the manufacture of sulphuric acid.
- (ii) For preventing growth of fungi.
- (iii) For making calcium hydrogen sulphide used in bleaching pulp.
- (iv) For vulcanizing rubber.
- (v) For the manufacture of fireworks.

- A. (i), (ii) and (iii) only.
- B. (i), (iii), and (iv) only.
- C. (i), (ii), (iv), and (v) only.

D. (i), (ii), (iii), (iv), and (v).

The correct answer is option [D].

28. Iron (II) tetraoxosulphate decomposes to produce _____

- A. metallic oxides.
- B. metallic oxides and sulphur (IV) oxide.
- C. metallic oxides, sulphur (IV) oxides and sulphur (VI) oxides.
- D. metallic oxides and sulphur (VI) oxide.

The correct answer is option [C].

29. Which of the following option is used to prepare metallic trioxosulphates (VI)?

- A. Direct combination.
- B. Direct heating.
- C. Precipitation.
- D. Action with air.

The correct answer is option [C].

30. The reaction between sodium trioxosulphate (IV) tetraoxosulphate (VI) acid produces _____

- A. sulphur (VI) oxide.
- B. hydrogen sulphide.
- C. sulphur.
- D. sulphur (IV) oxide.

The correct answer is option [D].

31. Sulphur reacts with soft rubber to harden it by _____

- A. direct linkage.
- B. polymerization.

- C. cross linkage.
- D. smoking.

The correct answer is option [C].

32. Sulphur reacts with metals and non-metals to form _____

- A. tetraoxosulphate (VI).
- B. trioxosulphates (IV).
- C. sulphides.
- D. trioxothiosulphate (VI).

The correct answer is option [C].

33. The melting point of sulphur is _____

- A. 170°C.
- B. 200°C.
- C. 98°C.
- D. 115°C.

The correct answer is option [D].

34. Which of the allotropes of sulphur has amber colour with needle shapes?

- A. Rhombic sulphur.
- B. Plastic sulphur.
- C. Monoclinic sulphur.
- D. Flower of sulphur.

The correct answer is option [C].

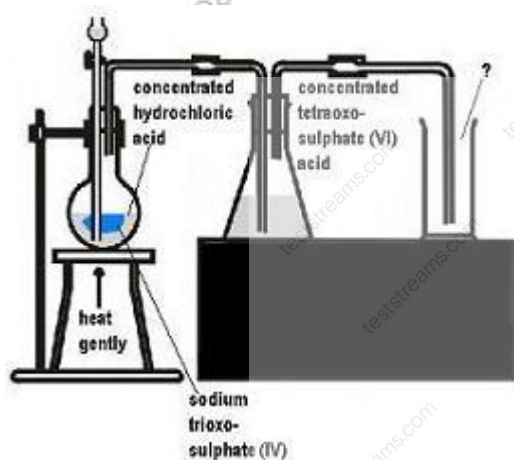
35. What catalyst is used in the preparation of sulphur (VI) oxide?

- A. phosphorus (V) oxide.
- B. platinized asbestos.

- C. vanadium (V) oxide.
- D. manganese (IV) oxide.

The correct answer is option [C].

36. The diagram drawn is an illustration for the preparation of _____



- A. sulphur (VI) oxide.
- B. sulphur.
- C. sulphur (IV) oxide.
- D. hydrogen sulphide.

The correct answer is option [C].

37. What catalyst is used when hydrogen sulphide is oxidized to sulphur?

- A. Aluminium hydroxide.
- B. Aluminium trioxocarbonate (IV).
- C. Aluminium hydride.
- D. Aluminium oxide.

The correct answer is option [D].

38. The feature developed when sulphur is heated gradually and in limited supply of air at 200°C is _____

- A. a brown vapour.
- B. a floral pattern.
- C. highly viscous.
- D. an amber-coloured liquid.

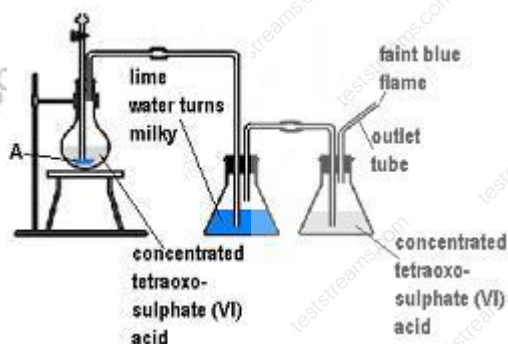
The correct answer is option [C].

39. Which of these ionizes slightly in water to form a dibasic acid?

- A. Ag_2S .
- B. $\text{K}_2\text{Cr}_2\text{O}_7$.
- C. FeCl_3 .
- D. H_2S .

The correct answer is option [D].

40. From the diagram drawn the part labelled A is _____



- A. ethanol.
- B. ethanal.
- C. ethanedioic acid.
- D. ethene.

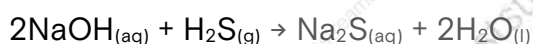
The correct answer is option [C].

41. To test for hydrogen sulphide _____ is used.

- A. iron (III) chloride
- B. potassium heptaoxochromate (VI)
- C. potassium tetraoxomanganate (VII)
- D. lead (II) trioxonitrate (V)

The correct answer is option [D].

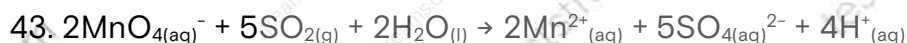
42. From the reaction given below,



hydrogen sulphide is acting as _____

- A. base.
- B. amphoteric compound.
- C. acid.
- D. salt.

The correct answer is option [C].



The equation given above can be balanced by _____

- A. adding 2 electrons to the product.
- B. adding 2 electrons to the reactant.
- C. removing 2 electrons from the product.
- D. removing 2 electrons from the reactant.

The correct answer is option [B].

44. Yellow paints are prepared (in the presence of Fe^{3+}) using _____

- A. SbS_3 .
- B. MnS .
- C. ZnS .

D. SnS_2 .

The correct answer is option [D].

45. Which of the following properties of sulphur are correct?

(i) Sulphur exist in one form, crystalline.

(ii) It is soluble in water but soluble in carbon (IV) sulphide and methyl benzene (toluene).

(iii) It has a melting point of 115°C and a boiling point of 444°C .

(iv) Density depends on allotropic form.

A. (i), (ii), (iii) and (iv).

B. (i), (ii) and (iii).

C. (ii), (iii) and (iv).

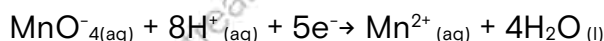
D. (i), (iii) and (iv).

The correct answer is option [C].

TOPIC: TYPES OF REACTION. OXIDATION AND REDUCTION

DIRECTION: Choose the correct options from the lettered options.

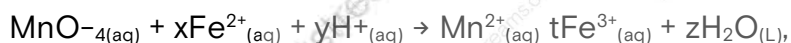
1. What is the change in oxidation number of manganese in the reaction represented by the equation given below?



- A. +3 to +2.
- B. +4 to +2.
- C. +5 to +2.
- D. +7 to +2.

The correct answer is option [D].

2. From the balanced redox equation given below:



What are the values of x and t?

- A. 5 and 5.
- B. 5 and 8.
- C. 8 and 5.
- D. 5 and 4.

The correct answer is option [A].

3. The most common feature of reactions at the anode is that _____

- A. electrons are consumed.
- B. oxidation is involved.
- C. ions are reduced.
- D. the electrode dissolves.

The correct answer is option [B].

4. Which of the following is/are manufactured by electrolysis?

- (I) Calcium
- (II) Chlorine
- (III) Aluminium
- (IV) Iron

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

5. $2\text{FeCl}_2(\text{s}) + \text{Cl}_2 \rightarrow 2\text{FeCl}_3(\text{s})$

The reducing agent in the reaction above is _____.

- A. FeCl_2
- B. FeCl_3
- C. Cl_2
- D. Fe

The correct answer is option [A].

6. Promoters in chemical reactions _____

- A. improve the speed of chemical reactions.
- B. improve the efficiency of a catalyst.
- C. improve the stability of products.
- D. improve the stability of reactants.

The correct answer is option [B].

Reason: Promoters are substances which improve the efficiency of a catalyst.

7. The oxidation state of sulphur in tetraoxosulphate [VI] is _____

- A. +5.
- B. -6.
- C. +6.
- D. +4.

The correct answer is option [C].

From the formula H₂SO₄ solve the oxidation state of sulphur

where H = +1, O = -2, S = ?

8. **What can be inferred from the reaction given below?**



- A. Lead [II] oxide is oxidized.
- B. NO₂ is isolated.
- C. Pb[NO₃]₂ is decomposed.
- D. Pb[NO₃]₂ is dissociated.

The correct answer is option [D].

Reason: Thermal dissociation which involves heat is when a substance dissociates into two or simpler molecules or atoms.

9. A substance which gains oxygen, loses hydrogen, or loses electrons is said to be _____

- A. oxidized.
- B. reduced.
- C. reacted.
- D. decomposed.

The correct answer is option [A].

10. In the reaction below _____



- A. $\text{Pb}(\text{NO}_3)_2$ is dissociated.
- B. Lead (II) oxide is oxidized.
- C. NO_2 is isolated.
- D. O_2 is an oxidizing agent.

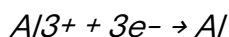
The correct answer is option [A].

11. What current in amperes will deposit 2.7g of Aluminium in 2 hours?

[Al = 27, F = 96,500 C mol⁻¹]

- A. 32 A.
- B. 8 A.
- C. 4 A.
- D. 16 A.

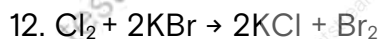
The correct answer is option [C].



$$3\text{e}^- = 3F$$

$$\Rightarrow (2.7/27) \times [(3 \times 96500)/(60 \times 60 \times 2)]$$

$$= 0.1 \times 40.2083 = 4.02083 = 4\text{A.}$$



In the equation given above chlorine is _____

- A. an oxidizing agent.
- B. a reducing agent.
- C. an electron donor.
- D. an acid.

The correct answer is option [A].

13. The oxidation number of chlorine is +1 in _____

- A. KClO_3 .
- B. NaClO .
- C. ZnCl_2 .
- D. HCl .

The correct answer is option [B].

Let the oxidation number of $\text{Cl} = x$

$$\text{Na} = +1$$

$$\text{O} = -2$$

$$\text{NaClO} = 0 (+1) + (x) + (-2) = 0$$

$$1 + x - 2 = 0$$

$$x = 2 - 1$$

$$x = +1$$

14. Which of the following statements is true?

- A. H_2O_2 is a strong electrolyte.
- B. $\text{C}_6\text{H}_{12}\text{O}_6$ is a non-electrolyte.
- C. CH_3 is a weak electrolyte.
- D. All of the above.

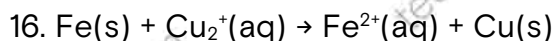
The correct answer is option [D].

15. The reaction represented by the equation;



- A. double decomposition.
- B. neutralization.
- C. reversible.
- D. usually catalyzed.

The correct answer is option [B].



Which of the following options can be inferred from the reaction above?

- A. Fe is an oxidizing agent
- B. Fe is reduced
- C. Cu^{2+} loses electrons
- D. Cu^{2+} is the oxidizing agent

The correct answer is option [B].

17. What reactions occurs at the electrodes during the electrolysis of concentrated sodium chloride solution using carbon electrode?

- A. Oxidation takes place at the anode.
- B. Chlorine is evolved at the anode.
- C. Hydrogen is evolved at the cathode.
- D. All of the above.

The correct answer is option [D].

18. Which of the following statements is true of the electrochemical series?

- A. Electropositivity of metals increases down the series.
- B. Electropositivity of non-metals decreases down the series.
- C. Electronegativity of non-metals increases down the series.
- D. Electropositivity of metals decreases down the series.

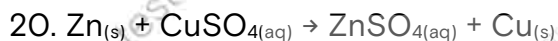
The correct answer is option [A].

19. Which of the following statements are correct?

- (I) A primary cell cannot maintain a steady current over a long period.
- (II) Polarization is said to occur in a cell when hydrogen bubbles form on the plates.
- (III) The Daniel cell is an electrochemical cell.
- (IV) lead accumulators is used as a car battery.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].



The above half equation is _____

- A. $\text{Zn}_{(s)} \rightarrow \text{Zn}^{2+}_{(aq)} + 2e^-$; $\text{Cu}^{2+}_{(aq)} + 2e^- \rightarrow \text{Cu}_{(s)}$.
- B. $\text{Zn}^{2+}_{(aq)} \rightarrow \text{Zn}_{(s)} + 2e^-$; $\text{Cu}^{2+}_{(aq)} \rightarrow \text{Cu}_{(s)} + 2e^-$
- C. $\text{Zn}_{(s)} + 2e^- \rightarrow \text{Zn}^{2+}_{(aq)}$; $\text{Cu}^{2+}_{(aq)} - 2e^- \rightarrow \text{Cu}_{(s)}$.
- D. $\text{Zn}^{2+}_{(aq)} - 2e^- \rightarrow \text{Zn}_{(s)}$; $\text{Cu}^{2+}_{(aq)} \rightarrow \text{Cu}_{(s)} + 2e^-$.

The correct answer is option [A].

21. The oxidation number of the manganese atom in potassium tetraoxomanganate [VII] KMnO_4 is _____

- A. +7.
- B. -7.
- C. +5.
- D. +6.

The correct answer is option [A].

Solution: The electrical charge of K is +1, O is -2, Mn is unknown [y]; The summation of all the charges in a compound when there is no charge indicated in the compound is zero; $+1+y+[-2 \times 4] = 0$; $+1+y-8 = 0$; $y - 7 = 0$, therefore, $y = +7$.

22. Oxidation reaction may be defined as follows except _____

- A. a reaction in which electron is lost.
- B. a reaction in which there is an increase in the oxidation number.
- C. a reaction in which oxygen is gained.

D. a reaction in which hydrogen is gained.

The correct answer is option [D].

23. Rusting is an example of _____ reaction.

- A. redox
- B. combination
- C. combustion
- D. decomposition

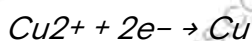
The correct answer is option [A].

24. What mass of copper would be deposited by a current of 1.0 amperes passing for 965 seconds through copper (II) tetraoxosulphate (VI) solution?

[Cu = 63.5, 1F = 96,500 C]

- A. 0.318 g.
- B. 0.635 g.
- C. 3.18 g.
- D. 6.35 g.

The correct answer is option [A].



2F will liberate 63.5 g of Cu.

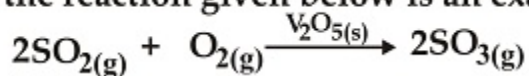
$$Q = It$$

$$Q = 1.0 \times 965$$

(1.0 x 965)C will liberate 1.0 x 965 x 63.5/96500 x 2

$$61277.5/19300 = 0.318\text{g}$$

25. In the reaction given below is an example of _____



- A. homogeneous catalysis.

- B. heterogeneous catalysis.
- C. inert catalysis.
- D. contact catalysis.

The correct answer is option [B].

26. The rules for determining oxidation numbers include the following option as stated except _____

- A. the oxidation number of all elements in the free state is zero.
- B. the oxidation number of a simple ion has the same size and sign as the charge of the ion.
- C. the algebraic sum of the oxidation numbers of all the elements in a compound is positive.
- D. the algebraic sum of the oxidation numbers of all the elements in a compound is zero.

The correct answer is option [C].

27. A reducing agent is a substance _____

- A. which brings about an oxidation and it is itself reduced during a reaction.
- B. which brings about an oxidation and it is itself oxidized during a reaction.
- C. which brings about a reduction and it is itself reduced during a reaction.
- D. which brings about a reduction and it is itself oxidized during a reaction.

The correct answer is option [D].

28. When hydrogen sulphide is burnt in oxygen to form sulphur [iv] oxide and water the oxidation number of sulphur changes from _____ to _____

- A. -2 to -2.
- B. -4 to +4.
- C. -2 to +4.
- D. -2 to -4.

The correct answer is option [C].

Ionic equation is $S^{2-} \rightarrow SO_2$.

29. Selective discharge of ions during electrolysis depends on the _____

- (i) position of ions in the electrochemical series
- (ii) nature of the electrodes
- (iii) charge on the ions
- (iv) quantity of electricity passed through the electrolyte

- A. I & II
- B. III & IV
- C. I, II & III
- D. I, II, III & IV

The correct answer is option [A].

Note that selective discharge of ions during electrolysis depends on;

i. position of the ion in the electrochemical series.

ii. concentration of ions.

iii. nature of electrode.

30. Which of the following substances conducts electricity in the molten state but not in the solid state?

- A. Iron filings.
- B. Paraffin wax.
- C. Potassium chloride.
- D. Sulphur.

The correct answer is option [C].

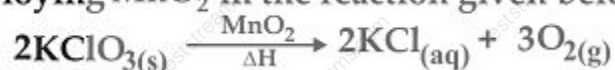
31. Which of the following is/are manufactured by the electrolysis of concentrated sodium chloride solution?

- (I) Chlorine.
- (II) Sodium hydroxide.
- (III) Hydrogen.
- (IV) Sodium oxochlorate (I).

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [C].

32. In employing MnO_2 in the reaction given below, _____



- A. MnO_2 is catalysed.
- B. KClO_3 is catalysed.
- C. the forward reaction is catalysed.
- D. the backward reaction is catalysed.

The correct answer is option [C].

33. All electrolytic changes at a cathode must be _____

- A. reduction as ions lose electrons.
- B. oxidation as ions lose electrons.
- C. reduction as ions gain electrons.
- D. oxidation as ions gain electrons.

The correct answer is option [C].

34. Oxidation is a reaction, which can involve _____

- (I) loss of electrons.
- (II) Increase in oxidation number.
- (III) gain of oxygen.
- (IV) loss of hydrogen.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

35. Why is it that oxidation and reduction reactions occur together?

- A. Because they involve two opposing yet complementary processes and transfer of electrons.
- B. Because they involve transfer of atoms.
- C. Because they involve two opposing complementary processes.
- D. Because they involve two opposing yet complementary processes and transfer of atoms.

The correct answer is option [A].

36. Which of the following does not define oxidation?

- A. Removal of electron[s].
- B. Addition of oxygen.
- C. Removal of electronegative elements.
- D. Increase of oxidation number in the positive direction.

The correct answer is option [C].

37. All of the following except _____ affects the discharge of ions during electrolysis.

- A. position of the ions in the redox series.
- B. concentration of ions.
- C. nature of electrodes.
- D. temperature of the solution.

The correct answer is option [D].

38. Which of the following is a property of the cathode ray?

- A. They flow from the cathode to the anode.
- B. Travel in straight line and cast a shadow of an object placed in their path.
- C. Are negatively charged.
- D. All of the above.

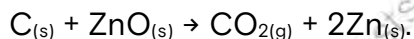
The correct answer is option [D].

39. In the process of silver-plating a metal M is formed, the metal M is the _____.

- A. anode and a direct current is used
- B. cathode and an alternating current is used
- C. anode and an alternating current is used
- D. cathode and a direct current is used

The correct answer is option [B].

40. From the equation given below,

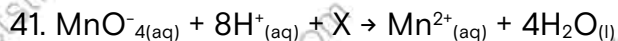


the oxidation number of free carbon is _____

- A. -4.
- B. +4.
- C. Zero.

D. +2.

The correct answer is option [C].



In balancing the above redox equation, what is the value X?

A. 10e.

B. 2e.

C. 5e.

D. 4e.

The correct answer is option [C].

42. If Fe has an oxidation number of +2, what is the value of X in the complex ion $[\text{Fe}(\text{CN})_6]^{X-}$?

A. -4.

B. -3

C. -2.

D. +3.

The correct answer is option [A].

43. Which of the following is the correct test for oxidizing agents?

[i] Action on iron [II] chloride.

[ii] Action on acidified potassium tetraoxomanganate [VII].

[iii] Action on acidified potassium heptaoxochromate [VI].

[iv] Action on hydrogen sulphide.

A. [i] and [iii] only.

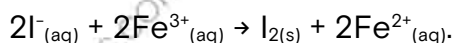
B. [ii] and [iv] only.

C. [i] and [iv] only.

D. [ii] and [iii] only.

The correct answer is option [C].

44. From the reaction below, which ion is a reducing agent?



- A. I^-
- B. 2Fe^{3+}
- C. I_2
- D. 2Fe^{2+}

The correct answer is option [A].

Reason: The oxidation number increases, a substance which brings about a reduction, it is itself oxidized during the reaction and an electron donor.

45. Carbon acts as a reducing agent in all of these reactions except _____

- A. $\text{C}_{(\text{s})} + 2\text{H}_{2(\text{g})} \rightarrow \text{CH}_{4(\text{g})}$
- B. $\text{C}_{(\text{s})} + \text{CuO}_{(\text{s})} \rightarrow \text{Cu}_{(\text{s})} + \text{CO}_{2(\text{g})}$
- C. $\text{C}_{(\text{s})} + \text{Fe}_2\text{O}_{3(\text{s})} \rightarrow 2\text{Fe}_{(\text{s})} + 3\text{CO}_{(\text{g})}$
- D. $\text{C}_{(\text{s})} + \text{CO}_{2(\text{g})} \rightarrow 2\text{CO}_{(\text{g})}$

The correct answer is option [A].

46. Oxidation and reduction have had many definitions assigned to them at different times. Which of these is not one such definitions of oxidation?

- A. The addition of oxygen to or removal of hydrogen from a substance.
- B. Increase in concentration of positive ions.
- C. Increase in oxidation number.
- D. The process of electron loss.

The correct answer is option [B].

47. Which of the following steps are followed in balancing atoms and charges in a redox equation?

- [i] Add the appropriate numerical coefficients.

[ii] Place the correct number of H₂O, H⁺ or OH⁻ on the appropriate side of the equation if necessary.

[iii] Add the correct number of electrons on the right and left hand side for the oxidation and reduction half-equation.

- A. [i] and [iii] only.
- B. [ii] and [iii] only.
- C. [i], [ii] and [iii].
- D. [i] only.

The correct answer is option [C].

48. What is the oxidation number of chromium in sodium heptaoxochromate [VI]?

- A. +3.
- B. +6.
- C. +12.
- D. +2.

The correct answer is option [B].

Formula of sodium heptaoxochromate (VI) is Na₂Cr₂O₇; summation of the charges of the compound = [+1 x 2] + [y x 2] + [-2 x 7] = 0 where the charges of each element is given as Na = +1, Cr = +2, O = -2; +2 + 2y - 14 = 0; 2y - 12 = 0; y = 12/2 = +6.

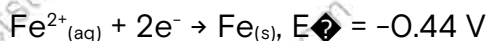
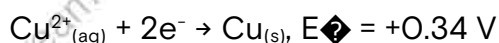
49. Which of the option is not the most common way of balancing redox equations?

- A. Write down the oxidizing agent and the reducing agent. Deduce the product in each case.
- B. Write the half-equation for oxidation and reduction. Balance the atoms and charges for each equation.
- C. Combine the half-equations to add the electrons and get the overall redox equation.
- D. Make sure that the electron loss in the oxidation half-equation is balanced by the electron gain in the reduction half-equation.

The correct answer is option [C].

50. A feasible cell was constructed by joining the two half cells below:

What is the standard e.m.f of the cell?



- A. -0.78 V.
- B. -0.10 V.
- C. +0.10 V.
- D. +0.78 V.

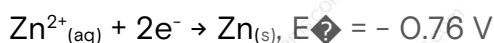
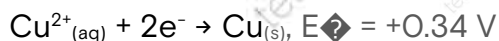
The correct answer is option [D].

$$E.m.f = [+ 0.34 - (- 0.44)]V$$

$$= + 0.34 + 0.44 \text{ V}$$

$$= + 0.78 \text{ V}$$

51. A feasible cell was constructed by joining the two half cells below:



What is the E.m.f.?

- A. -1.1 V
- B. -0.42 V
- C. +0.42 V
- D. +1.1 V

The correct answer is option [D].

$$E.m.f = + 0.34 \text{ V} - (- 0.76 \text{ V})$$

$$= +0.34 \text{ V} + 0.76 \text{ V}$$

$$= +1.1 \text{ V}$$

52. Which of the following statements is the best definition of a cathode?

- A. It is the negatively charged electrode.
- B. It is the electrode at which electrons leave the electrolyte.
- C. It is the positively charge electrode.
- D. It is the electrode at which hydrogen is evolved.

The correct answer is option [A].

53. Which of the following statements describes oxidation?

- A. Addition of hydrogen to a compound.
- B. A gain of one or more electrons.
- C. An increase in valency [oxidation state] of a metal.
- D. A decrease in the number of negatively charged ions present in the formula of a compound.

The correct answer is option [C].

54. Which of the following statements about cathode rays is incorrect?

- A. They emerge at right angles to the cathode.
- B. They are deflected away from negative plates.
- C. They are very light.
- D. They are positively charged.

The correct answer is option [D].

55. Oxidation number of an element is _____

- A. the ion it appears to have as determined by a set of arbitrary rules.
- B. the change it appears to have.
- C. the electrical charge it appears to have as determined by a set of arbitrary rules.
- D. none of the above.

The correct answer is option [C].



In the equation of reaction given above the oxidation number of hydrogen changes from _____ to _____

- A. +2 to +1.
- B. +4 to +1.
- C. +1 to +2.
- D. 0 to +2.

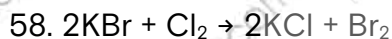
The correct answer is option [D].

57. The oxidation number of sulphur in iron (II) sulphide is _____

- A. +2.
- B. -2.
- C. -4.
- D. +6.

The correct answer is option [D].

Solution: The chemical equation: FeSO_4 ; $\text{Fe} = +2$, $\text{S} = ?$, $\text{O}_4 = -2 \times 4 = -8$; $+2 + ? - 8 = 0$; $? - 6 = 0$; $? = +6$.



In the reaction above, the role of chlorine is that of _____

- A. an acid.
- B. a base.
- C. an oxidizing agent.
- D. a reducing agent.

The correct answer is option [C].

59. Electrolysis can be used to _____

(I) purify metals.

- (II) extract elements.
- (III) manufacture compounds.
- (IV) electroplate metals.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

60. Which of the following methods are applicable in preventing corrosion in metals?

- (I) Storing in oil.
- (II) Allowing an inert oxide surface layer to form.
- (III) Coating with paint or tar.
- (IV) Plating with another metal.

- A. I & II.
- B. III & IV.
- C. I, II & III.
- D. I, II, III & IV.

The correct answer is option [D].

61. Which of the following is not true of the rusting of iron?

- A. Rusting is a reduction process
- B. Rusting of iron takes place in the presence of oxygen and moisture
- C. The rust formed is reddish brown
- D. The major constituent of rust is hydrated iron (iii) oxide

The correct answer is option [A].

62. Which of the following statements is/are correct about electrochemical cells?

(I) Reduction occurs in one half cell while oxidation occurs in the other.

(II) The electrode in a half cell may take part in the reaction.

(III) It consists of two half cells.

(IV) Electrons flow from the anode to the cathode.

A. I & II.

B. III & IV.

C. I, II & III.

D. I, II, III & IV.

The correct answer is option [D].

63. Which of the following option defines oxidation in terms of oxygen and hydrogen?

A. the addition of oxygen and addition of hydrogen in a reaction.

B. the removal of oxygen and addition of hydrogen in a reaction.

C. the addition of oxygen and removal of hydrogen in a reaction.

D. the removal of oxygen and removal of hydrogen in a reaction.

The correct answer is option [C].

64. The major difference between thermal dissociation and thermal decomposition is _____

A. thermal dissociation is not reversible.

B. thermal decomposition is reversible.

C. thermal dissociation is reversible.

D. thermal decomposition requires moderate heat.

The correct answer is option [C].

65. Which of the following does not affect the discharge of ions during electrolysis?

- A. Position of the ions in the redox series
- B. Concentration of the ions
- C. Nature of electrodes
- D. Temperature of the solution

The correct answer is option [D].