CBSE EXAMINATION PAPER-2024

CHEMISTRY

(Solved)

Time allowed : 3 hours | Maximum Marks : 18

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **29 questions.** All questions are **compulsory.**

ii. This question paper is divided into **3 sections.**

iii. **Section A** – questions number **1 to 14** are multiple choice questions Each question carries **1 marks.**

iv. **Section B** – questions number **15 to 16** are very short answer Each question carries **2 marks.**

v. **Section C** – questions number **17 to 29** are case based questions

vi. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

vii. Use of calculator is NOT allowed.

Section A

Question 1.

Which one of the following first row transition elements is expected to have the highest third ionization enthalpy ?

[1 Marks]

(A) Manganese (Z = 25)

(B) Vanadium (Z = 23)

(C) Chromium (Z = 24)

(D) Iron (Z = 26)

Question 2.

Two among the three components of DNA are β-D-2-deoxyribose and a heterocyclic base. The third component is :

[1 Marks]

(A) Phosphoric acid

(B) Adenine

(C) Sulphuric acid

(D) Uracil

Question 3.

For an electrolyte undergoing association in a solvent, the vant factor :

[1 Marks]

(A) has negative value

(B) has zero value

(C) is always greater than one

(D) is always less than one

Question 4.

For the reaction $X + 2Y \rightarrow P$, the differential form equation of the rate law is :

[1 Marks]

(A) $-d[P]/dt = -d[X]/dt$

(B) $-2d[Y]/dt = +d[P]/dt$

(C) $2d[P]/dt = -d[Y]/dt$

(D) $+d[X]/dt = -d[P]/dt$

Question 5.

Acetic acid reacts with PCl_5 to give :

[1 Marks]

(A) CCl_3 -COOH

(B) Cl -CH_2 -COOH

(C) Cl -CH_2 -COCl

(D) CH_3- COCl

Question 6.

The formation of cyanohydrin from an aldehyde is an example of :

[1 Marks]

(A) nucleophilic addition

(B) electrophilic addition

(C) electrophilic substitution

(D) nucleophilic substitution

Question 7.

The reaction of an alkyl halide with sodium alkoxide forming ether is known as :

[1 Marks]

(A) Reimer-Tiemann reaction

(B) Williamson synthesis

(C) Kolbe reaction

(D) Wurtz reaction

Question 8.

The correct order of the ease of dehydration of the following alcohols by the action of conc. H_2SO_4 is :

[1 Marks]

(A) $(CH_3)_2CH$- OH > $(CH_3)_3C$- OH > CH_3CH_2- OH

(B) $(CH_3)_2CH-OH > CH_3CH_2-OH > (CH_3)_3C-OH$

(C) $CH_3CH_2-OH > (CH_3)_2CH-OH > (CH_3)_3C-OH$

(D) $(CH_3)_3C-OH > (CH_3)_2CH-OH > CH_3CH_2-OH$

Question 9.

Which functional groups of glucose interact to form cyclic hemiacetal leading to pyranose structure ?

[1 Marks]

(A) Ketone group and hydroxyl group at C- 4

(B) Aldehyde group and hydroxyl group at C- 4

(C) Ketone group and hydroxyl group at C- 5

(D) Aldehyde group and hydroxyl group at C- 5

Question 10.

Assertion (A) : When NaCl is added to water a depression in freezing point is observed.

Reason (R) : NaCl undergoes dissociation in water.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is false, but Reason (R) is true.

(D) Assertion (A) is true, but Reason (R) is false.

Question 11.

Assertion (A) : Separation of Zr and Hf is difficult.

Reason (R) : Zr and Hf have similar radii due to lanthanoid contraction.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Assertion (A) is true, but Reason (R) is false.

(C) Assertion (A) is false, but Reason (R) is true.

(D) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

Question 12.

Assertion (A) : The pK_a of ethanoic acid is lower than that of Cl $-CH_2-$ COOH.

Reason (R) : Chlorine shows electron withdrawing (I) effect which increases the acidic character of Cl -CH 2- COOH.

[1 Marks]

(A) Assertion (A) is false, but Reason (R) is true.

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(D) Assertion (A) is true, but Reason (R) is false.

Question 13.

Assertion (A) : Aniline is a stronger base than ammonia.

Reason (R) : The unshared electron pair on nitrogen atom in aniline becomes less available for protonation due to resonance.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

Question 14.

Which of the following compounds will give a ketone on oxidation with chromic anhydride (CrO_3) ?

[1 Marks]

(A) $CH_3 - CH_2 - CH(OH) - CH_3$

(B) $(CH_3)_3C - OH$

(C) CH3CH2CH2OH

(D) (CH3)2CH -CH2OH

Section B

Question 15.

Calculate the potential of Iron electrode in which the concentration of

Fe2+ ion is 0·01 M.

($E^{o}Fe2+/Fe$ = 0·45 V at 298 K)

[Given : log 10 = 1]

[2 Marks]

Question 16.

Define molecularity of the reaction. State any one condition in which a bimolecular reaction may be kinetically of first order

[2 Marks]

Section C

Question 17. Batteries and fuel cells are very useful forms of galvanic cell. Any battery or cell that we use as a source of electrical energy is basically a galvanic cell. However, for a battery to be of practical use it should be reasonably light, compact and its voltage should not vary appreciably during its use. There are mainly two types of batteries: primary batteries and secondary batteries. In the primary batteries, the reaction occurs only once and after use over a period of time the battery becomes dead and cannot be reused again, whereas the secondary batteries are rechargeable. Production of electricity

by thermal plants is not a very efficient method and is a major source of pollution. To solve this problem, galvanic cells are designed in such a way that energy of combustion of fuels is directly converted into electrical energy, and these are known as fuel cells. One such fuel cell was used in the Apollo space programme.

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Answer the following questions :

Question 19.

Question 20.

Question 21.

Question 22.

Question 23.

Question 24.

Question 25.

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converted into electrical energy, and these are known as fuel cells. One such fuel cell was used in the Apollo space programme. Answer the following questions :

Question 26.

Batteries and fuel cells are very useful forms of galvanic cell. Any battery or cell that we use as a source of electrical energy is basically a galvanic cell. However, for a battery to be of practical use it should be reasonably light, compact and its voltage should not vary appreciably during its use. There are mainly two types of batteries secondary batteries. primary batteries and In the primary batteries, the reaction occurs only once and after use over a period of time the battery becomes dead and cannot be reused again, whereas the secondary batteries are rechargeable. Production of electricity by thermal plants is not a very efficient method and is a major source of pollution. To solve this problem, galvanic cells are designed in such a way that energy of combustion of fuels is directly converted into electrical energy, and these are known as fuel cells. One such fuel cell was used in the Apollo space programme. Answer the following questions :

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Question 29. Batteries and fuel cells are very useful forms of galvanic cell. Any battery or cell that we use as a source of electrical energy is basically a galvanic cell. However, for a battery to be of practical use it should be reasonably light, compact and its voltage should not vary appreciably during its use. There are mainly two types of batteries secondary batteries. primary batteries and In the primary batteries, the reaction occurs only once and after use over a period of time the battery becomes dead and cannot be reused again, whereas the secondary batteries are rechargeable. Production of electricity by thermal plants is not a very efficient method and is a major source of pollution. To solve this problem, galvanic cells are designed in such a way that energy of combustion of fuels is directly converted into electrical energy, and these are known as fuel cells. One such fuel cell was used in the Apollo space programme.