

CBSE EXAMINATION PAPER-2023

CHEMISTRY

(Solved)

Time allowed : 3 hours

Maximum Marks : 16

General Instructions :

Read the following instructions carefully and follow them :

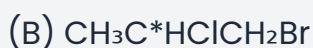
- This question paper contains **15 questions**. All questions are **compulsory**.
- This question paper is divided into **3 sections**.
- Section A** – questions number **1 to 12** are multiple choice questions Each question carries **1 marks**.
- Section B** – questions number **13 to 14** are very short answer Each question carries **2 marks**.
- Section C** – questions number **15 to 15** are case based questions
- There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.
- Use of calculator is NOT allowed.

Section A

Question 1.

Which of the following molecules has a chiral centre correctly labelled with an asterisk (*)?

[1 Marks]



(D) $\text{HOCH}_2\text{C}^*\text{H}(\text{OH})\text{CH}_2\text{OH}$

Question 2.

Which of the following alcohols will not undergo oxidation?

[1 Marks]

(A) 3-Methylbutan-2-ol

(B) 2-Methylbutan-2-ol

(C) Butan-2-ol

(D) Butanol

Question 3.

A voltaic cell is made by connecting two half cells represented by half equations below:

$\text{Sn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}(\text{s})$ $E^\circ = -0.14 \text{ V}$ $\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq})$ $E^\circ = +0.77 \text{ V}$ Which statement is correct about this voltaic cell?

[1 Marks]

(A) Fe^{2+} is oxidised and the voltage of the cell is 0.91 V

(B) Sn is oxidised and the voltage of the cell is 0.63 V

(C) Fe^{2+} is oxidised and the voltage of the cell is -0.91 V

(D) Sn is oxidised and the voltage of the cell is 0.91 V

Question 4.

Four half reactions I to IV are shown below:

I. $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$

II. $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 2\text{e}^-$

III. $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$

IV. $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$ Which two of these reactions are most likely to occur when concentrated brine is electrolysed?

[1 Marks]

(A) I and III

(B) I and IV

(C) II and III

(D) II and IV

Question 5.

Which property of transition metals enables them to behave as catalysts?

[1 Marks]

(A) Alloy formation

(B) Variable oxidation states

(C) High ionisation enthalpy

(D) High melting point

Question 6.

In the two tetrahedral structures of dichromate ion,

[1 Marks]

(A) All Cr – O bonds are equivalent in length.

(B) All Cr – O bonds are non-equivalent.

(C) 6 Cr – O bonds are equivalent in length.

(D) 4 Cr – O bonds are equivalent in length.

Question 7.

1 mole of liquid A and 2 moles of liquid B make a solution having a total vapour pressure 40 torr. The vapour pressure of pure A and pure B are 45 torr and 30 torr respectively. The above solution

[1 Marks]

(A) shows positive deviation.

(B) is a maximum boiling azeotrope.

(C) shows negative deviation.

(D) is an ideal solution.

Question 8.

Which of the following would not be a good choice for reducing nitrobenzene to aniline?

[1 Marks]

- (A) H_2/Ni
- (B) Sn and HCl
- (C) LiAlH_4
- (D) Fe and HCl

Question 9.

Hydrolysis of sucrose is called

[1 Marks]

- (A) saponification
- (B) hydration
- (C) esterification
- (D) inversion

Question 10.

Which one of the following has lowest pK_a value?

[1 Marks]

- (A) $\text{Cl}-\text{CH}_2-\text{COOH}$
- (B) $\text{O}_2\text{N}-\text{CH}_2-\text{COOH}$
- (C) HCOOH
- (D) CH_3-COOH

Question 11.

Which of the following cell was used in Apollo space programme?

[1 Marks]

- (A) H_2-O_2 Fuel cell

(B) Daniel cell

(C) Mercury cell

(D) Dry cell

Question 12.

The magnetic moment of $[\text{NiCl}_4]^{2-}$ is [Atomic number : Ni = 28]

[1 Marks]

(A) 1.82 BM

(B) 5.46 BM

(C) 4.42 BM

(D) 2.82 BM

Section B

Question 13. Why is boiling point of o-dichlorobenzene higher than p-dichlorobenzene but melting point of para isomer is higher than ortho isomer?

[2 Marks]

Question 14.

Give the reaction of glucose with hydrogen cyanide. Presence of which group is confirmed by this reaction ?

[2 Marks]

Section C

Question 15. Nucleophilic Substitution reaction of haloalkane can be conducted according to both $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ mechanisms. $\text{S}_{\text{N}}1$ is a two step reaction while $\text{S}_{\text{N}}2$ is a single step reaction. For any haloalkane which mechanism is followed depends on factors such as structure of haloalkane, properties of leaving group, nucleophilic reagent and solvent. Influences of solvent polarity: In $\text{S}_{\text{N}}1$ reaction, the polarity of the system increases from the reactant to the transition state, because a polar solvent has a greater effect on the transition state than the reactant, thereby reducing activation energy and accelerating the reaction. In $\text{S}_{\text{N}}2$ reaction, the polarity of the system generally does not change from

the reactant to the transition state and only charge dispersion occurs. At this time, polar solvent has a great stabilizing effect on Nu than the transition state, thereby increasing activation energy and slowing down the reaction rate. For example, the decomposition rate (SN1) of tertiary chlorobutane at 25 °C in water (dielectric constant 79) is 300000 times faster than in ethanol (dielectric constant 24). The reaction rate (SN2) of 2-Bromopropane and NaOH in ethanol containing 40% water is twice slower than in absolute ethanol. Hence the level of solvent polarity has influence on both SN1 and SN2 reaction, but with different results. Generally speaking, weak polar solvent is favourable for SN2 reaction, while strong polar solvent is favourable for SN1. Generally speaking, the substitution reaction of tertiary haloalkane is based on SN1 mechanism in solvents with a strong polarity (for example ethanol containing water).

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