

Sample Paper 10

Class XII 2023-24

Chemistry

Time: 3 Hours

Max. Marks: 70

General Instructions:

1. There are 33 questions in this question paper with internal choice.
 2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
 3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
 4. SECTION C consists of 7 short answer questions carrying 3 marks each.
 5. SECTION D consists of 2 case-based questions carrying 4 marks each.
 6. SECTION E consists of 3 long answer questions carrying 5 marks each.
 7. All questions are compulsory.
 8. Use of log tables and calculators is not allowed.
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SECTION-A

Directions (Q. Nos. 1-16) : The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

1. Regarding criteria of catalysis which one of the following statements is not true?
 - (a) The catalyst is unchanged chemically at the end of the reaction
 - (b) A small quantity of catalyst is often sufficient to bring about a considerable amount of reaction
 - (c) In a reversible reaction the catalyst alters the equilibrium position
 - (d) The catalyst accelerates the reaction
2. By increasing the temperature, the vapour pressure of substance:
 - (a) always increases
 - (b) does not depend on temperature
 - (c) always decreases
 - (d) partially depends on temperature
3. Benzyl alcohol is obtained from benzaldehyde by
 - (a) Fitting's reaction
 - (b) Cannizzaro's reaction
 - (c) Kolbe's reaction
 - (d) Wurtz's reaction
4. The best way to prevent rusting of iron is
 - (a) Making it cathode
 - (b) putting in saline water
 - (c) both of these
 - (d) none of these

5. An example of double salt is
- (a) Bleaching powder (b) $K_4[Fe(CN)_6]$
(c) Hypo (d) Potash alum
6. A zero order reaction is one whose rate is independent of
- (a) the concentration of the reactants
(b) the temperature of reaction
(c) the concentration of the product
(d) the material of the vessel in which reaction is carried out
7. On hydrolysis of starch, we finally get
- (a) Glucose (b) Fructose
(c) Both a and b (d) Sucrose
8. Of the following transition metals, the maximum numbers of oxidation states are exhibited by:
- (a) Chromium ($Z = 24$) (b) Manganese ($Z = 25$)
(c) iron ($Z = 26$) (d) Titanium ($Z = 22$)
9. Which of the following undergoes Cannizzaro's reaction?
- (a) CH_3CHO (b) CH_3CH_2CHO
(c) $(CH_3)_2CHCHO$ (d) $HCHO$
10. Which one is most reactive towards S_N1 reaction?
- (a) $C_6H_5CH(C_6H_5)Br$ (b) $C_6H_5CH(CH_3)Br$
(c) $C_6H_5C(CH_3)(C_6H_5)Br$ (d) $C_6H_5CH_2Br$
11. The correct order of increasing basic nature for the bases NH_3 , CH_3NH_2 and $(CH_3)_2NH$ is :
- (a) $(CH_3)_2NH < NH_3 < CH_3NH_2$
(b) $NH_3 < CH_3NH_2 < (CH_3)NH$
(c) $CH_3NH_2 < (CH_3)_2NH < NH_3$
(d) $CH_3NH_2 < NH_3 < (CH_3)_2NH$
12. Which of the following concentration unit is independent of temperature?
- (a) Normality
(b) Molarity
(c) Formality
(d) Molality

Directions (Q. Nos. 13-16) : Each of the following questions consists of two statements, one is Assertion and the other is Reason. Give answer :

- 13. Assertion :** Maltose is a reducing sugar which gives two moles of D-glucose on hydrolysis.
Reason : Maltose has 1, 4- β -glycosidic linkage.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
- 14. Assertion :** The kinetics of the reaction :
 $mA + nB + pC \longrightarrow m'X + n'Y + p'Z$
Obey the rate expression as $\frac{dx}{dt} = k[A]^m[B]^n$.
- Reason :** The rate of the reaction does not depend upon the concentration of C.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
- 15. Assertion :** SN^2 reactions always proceed with inversion of configuration.
Reason : SN^2 reaction of an optically active aryl halide with an aqueous solution of KOH always gives an alcohol with opposite sign of rotation.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
- 16. Assertion :** Vitamin D cannot be stored in our body.
Reason : Vitamin D is fat soluble vitamin and is excreted from the body in urine.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.

SECTION-B

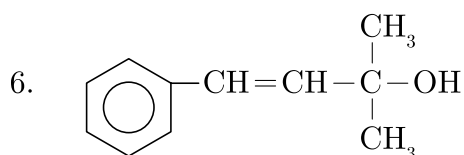
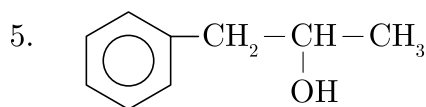
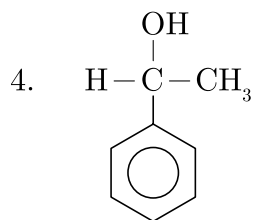
Directions (Q. Nos. 17-21) : This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17. What is the trend in melting point of transition metals when we move left to right in a series?
18. For what reason transition metals have high melting points?
19. What is rate law? Illustrate with an example.
20. Give one test from which methyl alcohol and ethyl alcohol are distinguished.
or
How are alcohols classified?
21. Give the reason of dipole in C – X bond.

SECTION-C

Directions (Q. Nos. 22-28) : This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

22. Explain Raoult's Law.
23. Mention a reaction for which the exponents of concentration terms are not the same as their stoichiometric coefficients in the rate equation.
24. Define specific conductance and equivalent conductance.
25. What may be the stable oxidation state of the transition element with the following d electrons configurations in the ground state of their atoms : $3d^3$, $3d^5$, $3d^8$ and $3d^4$?
26. Classify the following as primary, secondary and tertiary alcohols :
 1.
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array}$$
 2. $\text{H}_2\text{C} = \text{CH} - \text{CH}_2\text{OH}$



27. Discuss the structures of Carbonyl group.

or

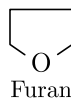
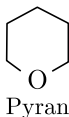
Why aldehydes are generally more reactive than Ketones in nucleophilic addition reactions?

28. Why do the gases always tend to be less soluble in liquids as the temperature is raised?

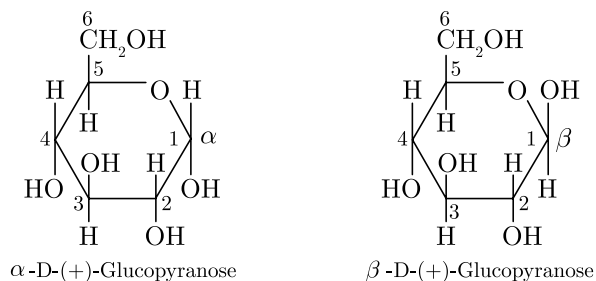
SECTION-D

Directions (Q. Nos. 29-30) : The following questions are case-based questions. Each question has an internal choice and carries 4 marks each. Read the passage carefully and answer the questions that follow.

29. Pentose and hexose undergo intramolecular hemiacetal or hemiketal formation due to combination of the $-\text{OH}$ group with the carbonyl group. The actual structure is either of five or six membered ring containing an oxygen atom. In the free state all pentoses and hexoses exist in pyranose form (resembling pyran). However, in the combined state some of them exist as five membered cyclic structures, called furanose (resembling furan).



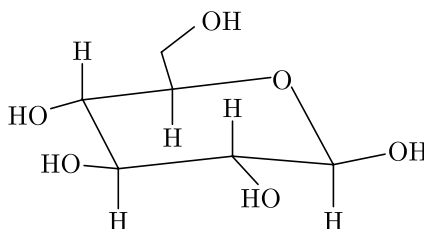
The cyclic structure of glucose is represented by Haworth structure :



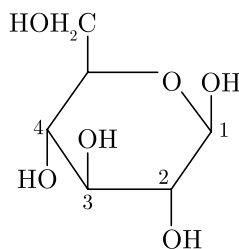
α – and β – *D* glucose have different configuration at anomeric (C – 1) carbon atom, hence are called anomers and the C – 1 carbon atom is called anomeric carbon (glycosidic carbon). The six membered cyclic structure of glucose is called pyranose structure.

Answer the following questions :

- Give the difference between α – *D*(+)-glucose and β – *D*(+) glucose ?
- The given carbohydrate is an α -furanose or a β -pyranose ?



- What is the structural difference between starch and cellulose?
- or**
- What is the anomers ? Find anomeric carbon in given structure.



- 30.** Elevation in boiling point is the increase in boiling point when a non volatile solute is added to the solvent.

Addition of the solute lowers the vapour pressure of solvent, hence more heat is required to increase the vapour pressure upto the atmospheric pressure. The addition of 3 g of a substance to 100 g CCl_4 ($M = 154 \text{ g mol}^{-1}$) raises the boiling point of CCl_4 by 0.60°C . $K_b(\text{CCl}_4)$ is $5.03 \text{ K kg mol}^{-1}$.

Given : $K_f(\text{CCl}_4) = 31.8 \text{ K kg mol}^{-1}$ and ρ (solution) = 1.64 g cm^{-3} .

Answer the following questions :

- Determine the relative lowering of vapour pressure of the solution.
- Determine the molar mass of the substance.
- What will be the freezing point depression of the solution ?

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or

- (d) Define molal elevation constant for a solvent. Why is elevation of boiling point a colligative property ?

or

- (e) Molal elevation constant may be defined as the elevation in boiling point when the molality of the solution is unity (i.e., 1 mole of the solute is dissolved in 1 kg (1000 g) of the solvent). The units of K_b are therefore, degree/molality i.e., K/m or °C/m or K kg mol⁻¹. Elevation of boiling point is a colligative property because it depends on number of solute particles present in a solution.

SECTION-E

Directions (Q. Nos. 31-33) : The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

- 31.** Write the chemistry of recharging the lead storage battery, highlighting all the material that are involved during recharging.

or

What is the function of salt bridge in an electrochemical cell?

- 32.** Discuss the nature of bonding in the following coordination entities on the basis of valence bond theory.

- (i) $[\text{Fe}(\text{CN})_6]^{4-}$
(ii) $[\text{FeF}_6]^{3-}$
(iii) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
(iv) $[\text{CoF}_6]^{3-}$

or

Explain $[\text{Co}(\text{NH}_3)_6]^{3+}$ is an inner orbital complex whereas $[\text{Ni}(\text{NH}_3)_6]^{2+}$ is an outer orbital complex.

- 33.** Accounts of the following

- (i) Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide.
(ii) Aniline does not undergo Friedel-Crafts reaction.
(iii) Diazonium salts of aromatic amines are more stable than those of aliphatic amines.

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