Sample Paper 8

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.

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. Which of the following is/are not affected by temperature?

(a) Molarity (b) Mole fraction

(c) Normality (d) All of these

2. The enzyme which can catalyse the conversion of glucose to ethanol is

(a) zymase (b) invertase

(c) maltase (d) diastase

3. When one Faraday of electric current is passed, the mass deposited, equal to

(a) One gram equivalent (b) One gram mole

(c) Electrochemical equivalent (d) Half gram equivalent

4. Which of the following is not a pyrimidine base ?

(a) Uracil (b) Cytosine

(c) Thymine (d) Guanine

5. If the rate of the reaction is equal to the rate constant, the order of the reaction is

(a) 3 (b) 0

(c) 1 (d) 2

6. Lucas reagent is

(a) Conc. HCl and anhydrous $ZnCl_2$ (b) Conc. HNO_3 and hydrous $ZnCl_2$

(c) Conc. HCl and hydrous $ZnCl_2$ (d) Conc. HNO_3 and anhydrous $ZnCl_2$

7. The transition metal which shows the highest oxidation state is :

(a) Mn (b) Pt

(c) Fe (d) Ni

8. Which of the following undergo aldol condensation?

(a) HCHO (b) CH_3CHO

(c) C_6H_5CHO (d) CH_3COCH_3

9. IUPAC name of $H_2[PtCl_6]$ is –

(a) Hydrogen hexachloro platinate (IV) (b) Hydrogen hexachloro platinate (II)

(c) Hydrogen hexa chlorido Pt (IV) (d) Hydrogen hexa chlorido Pt (II)

10. An isocyanide is prepared:

(a) Friedel-Crafts reaction (b) Perkin reaction

(c) Carbylamine reaction (d) Wurtz reaction

11. Chlorobenzene give DDT when it reacts with :

(a) charcoal (b) chloral

(c) naphthalene (d) benzenoid

12. Volume of one mole of any gas at NTP is :

(a) 11.2 litre (b) 22.4 litre

(c) 10.2 litre (d) 22.8 litre

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 :** Sucrose undergoes mutarotation.
Reason : Sucrose is a disaccharide.

(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 :** $CHCl_3$ is stored in dark bottles.
Reason : $CHCl_3$ is oxidised in dark.

(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 :** Sucrose is a non-reducing sugar.
Reason : It has 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.

16. **Assertion :** In rate law, unlike in the expression for equilibrium constants, the exponents for concentrations do not necessarily match the stoichiometric coefficients.
Reason : It is the mechanism and not the balanced chemical equation for the overall change that governs the reaction rate.

(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. Explain the Henry's law about dissolution of a gas in a liquid.

18. Write general expression for the amount of the substance left after n half lives.

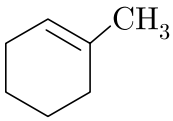
19. Write the IUPAC names of the following compounds :

1. $CH_3\,CHOH\,CH_2\,CHOH\,CH_3$
2. $C_6H_{50}OC_6H_5$

or

You are given benzene, conc. H_2SO_4 and NaOH. Write the equations for the preparation of phenol using these reagents.

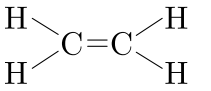
20. Complete the following reaction equations :

(i)  $+ HI \longrightarrow$

(ii) $CH_3CH_2CH = CH_2 + HBr \longrightarrow$

21. Complete the following reaction equations:

(i) $C_6H_5N_2Cl + KI \longrightarrow$

(ii)  $+ Br_2 \xrightarrow{CCl_4}$ .....

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. How molarity of a solution different from molality?

23. What is the effect of temperature on the rate constant of reaction? How can this temperature effect on the rate constant be represented quantitatively?

24. Define electrode and electrode potential.

25. How would you account for the irregular variation of ionization enthalpies (first and second) in the first series of the transition elements?

26. Account for the following :

1. The boiling point of ether is much lower than that of alcohol.
2. Phenol is more acidic than alcohol.

27. An organic compound (A) (molecular formula $C_8H_{16}O_2$) was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid produced (B). (C) on dehydration gives but-1-ene. Write equation for the reactions involved.

or

An organic compound with molecular formula $C_9H_{10}O$ forms, 2, 4-DNP derivatives, reduces Tollen's reagent and undergoes cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzenedicarboxylic acid. Identify the compound.

28. Write down the electronic configuration of

1. Cr^{3+}
2. Cu^{+}
3. Co^{2+}
4. Mn^{2+}

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. The substitution reaction of alkyl halide mainly occurs by S_N1 or S_N2 mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of S_N1 reactions are governed by the stability of carbocation whereas for S_N2 reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

Answer The following questions :

(a) Out of chlorobenzene and benzyl chloride, which one gets easily hydrolysed by aqueous NaOH and why?

(b) Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution reaction by S_N1 mechanism.

(c) Following compounds are given to you : 2-Bromopentane, 2-Bromo-2-methylbutane, 1-Bromopentane

(i) Write the compound which is most reactive towards S_N2 reaction.

(ii) Write the compound which is optically active.

or

(d) What are the points of similarities between S_N1 and S_N2 reactions?

30. For the first order decomposition reaction are as follows :

$(CH_3)_3COOC(CH_3)_3 \rightarrow 2CH_3COCH_3 + C_2H_6$

In the gaseous phase, the pressures of the system at $t = 0$ and $t = 15$ min were found to be 169.3 Torr and 256 Torr, respectively.

Answer the following questions according to the above given paragraph:

(a) What is the pressure of C_2H_6 at time t?

(b) Write integrated rate law expression for this reaction.

(c) Find out the value of rate constant k.?

or

(d) What is the total pressure of the system after 9 minutes?

$= 169.3 + 2 \times 27.38 = 224.06$

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. Predict giving reasons, the order of basicity of the following compounds is

(i) gaseous phase and

(ii) in aqueous solution $(CH_3)_3N, (CH_3)_2N, CH_3NH_2, NH_3$

32. State and explain Kohlrausch law

or

Predict the products of electrolysis of the following :

1. An aqueous solution of $AgNO_3$ with silver electrodes
2. An aqueous solution of $AgNO_3$ with platinum electrodes
3. An dilute aqueous solution of H_2SO_4 with platinum electrodes
4. An aqueous solution of $CuCl_2$ with platinum electrodes.

(Given $E^{o}_{Ag^+/Ag} = +0.80\,V$, $E^{o}_{Cu^{2+}/Cu} = +0.34\,V$)

33. How would you account for the fact that $[Fe(CN_6)]^{3-}$ is weakly paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic?

There is no unpaired electron therefore it is diamagnetic.

or

How does valence bond theory explain the bonding in the following complexes of nickel:

(i) $[NiCl_4]^{2-}$ is tetrahedral

(ii) $[Ni(CN)_4]^{2-}$ is square planar

(iii) $[Ni(CO)_4]$ is tetrahedral?

□□□□□□□