Sample Paper 14

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. As a result of osmosis, the volume of the solution :

(a) gradually decreases (b) gradually increases

(c) is not affected (d) suddenly increases

2. Alcohols of low molecular weight are

(a) Soluble in water (b) Soluble in water on heating

(c) Insoluble in water (d) Insoluble in all solvents

3. The conductivity of strong electrolyte is

(a) Increase on dilution electrolyte is

(b) Decrease on dilution

(c) Does not change with dilution

(d) Depends upon density of electrolytes itself

4. Which of the following aqueous solution has minimum freezing point ?

(a) 0.01 m NaCl (b) 0.005 m C_2H_5OH

(c) 0.005 m MgI_2 (d) 0.005 m $MgSO_4$

5. Units of rate constant of first and zero order reactions in terms of molarity M unit are respectively

(a) $\sec^{-1}, \mathrm{M}\sec^{-1}$

(b) $\sec^{-1}, \mathrm{M}$

(c) $\mathrm{M}\sec^{-1}, \sec^{-1}$

(d) $\mathrm{M}, \sec^{-1}$

6. The number of unpaired electrons in the complex ion $\left[\mathrm{CoF_6}\right]^{3-}$ is (Atomic no.: Co=27).

(a) zero

(b) 2

(c) 3

(d) 4

7. Isotonic solutions have same:

(a) Molar concentration

(b) Molality

(c) Normality

(d) None of these

8. The compound obtained by heating a mixture of a primary amine and choloroform with ethanolic potassium hydroxide (KOH) is :

(a) an alkyl cyanide

(b) a nitro compound

(c) an alkyl isocyanide

(d) an amide

9. The electronic configuration of gadolinium (Atomic number 64) is :

(a) $[\mathrm{Xe}]\,4f^8 5d^0 6s^2$

(b) $[\mathrm{Xe}]\,4f^3 5d^5 6s^2$

(c) $[\mathrm{Xe}]\,4f^6 5d^2 6s^2$

(d) $[\mathrm{Xe}]\,4f^7 5d^1 6s^2$

10. Haloforms are trihalogen derivatives of

(a) Ethane

(b) Methane

(c) Propane

(d) Benzene

11. Complete hydrolysis of cellulose gives

(a) D-ribose (b) D-glucose

(c) L-glucose (d) D-fructose

12. The reagent (s) which can be used to distinguish acetophenone from benzophenone is (are)

(a) 2, 4-Dinitrophenylhydrazine

(b) Aqueous solution of $NaHSO_3$

(c) Benedict reagent

(d) l_2 and Na_2CO_3

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 :** Aniline is better nucleophile than anilium ion
Reason : Anilium ion have positive charge.

(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 two strands of DNA are complementary to each other.
Reason : Adenine specifically forms hydrogen bonds with guanine whereas cytosine forms hydrogen bonds with thymine.

(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 :** NF_3 is a weaker ligand than N $(CH_3)_3$.
Reason : NF_3 ionizes to give F^- ions in aqueous solution.

(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 :** Anilinium chloride is more acidic than ammonium chloride.
Reason : Anilinium ion is resonance stabilized.
(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. No. 17-21) : This section contains 5 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

17. Define standard reduction potential of electrode.

18. Why transition metals have high enthalpies of ionization?

or

Why to transition elements show variable oxidation state?

19. Write the integrated equation for a first order reaction in terms of $[R]$, $[R]_0$ and t.

20. Write the chemical reaction of carbonyl group with : H_2O

21. Write a reaction which shows the presence of a primary alcoholic $(-OH)$ group in glucose.

SECTION-C

Directions (Q. No. 22-28) : This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.

22. What are cells? Name the two types of cells.

23. What is electrolysis? Give the reactions occurring at two electrodes during electrolysis of molten sodium chloride.

24. Calculate the number of unpaired electrons in the following gaseous ions : Mn^{3+}, Cr^{3+}, V^{3+} and Ti^{3+}. Which one of these is the most stable in aqueous solution?

25. What is meant by hydroboration-oxidation reaction? Illustrate it with an example

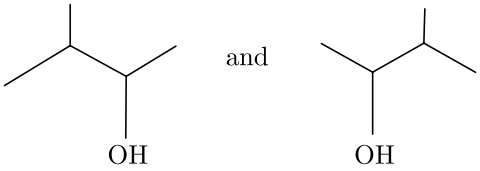
26. Ethylamine is soluble in water whereas aniline is not ?

27. What are essential and non essential amino acids? Give two examples of each type.

or

How do you explain the amphoteric behaviours of amino acids?

28. (i) Identify the chiral molecule in the following pair:



(a) (b)

(ii) Write the structure of the product when chlorobenzene is treated with methyl chloride in the presence of sodium metal and dry ether.

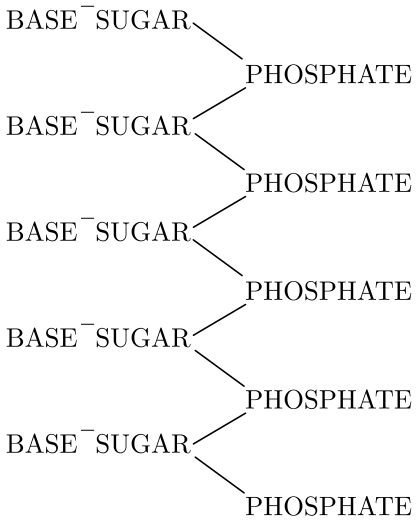
(iii) Write the structure of the alkene formed by dehydrohalogenation of 1-bromo-1-methylcyclohexane with alcoholic KOH.

SECTION-D

Directions (Q. No. 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 basic chemical formula of DNA is now well established. As shown in figure it consists of a very long chain, the backbone of which is made up of alternate sugar and phosphate groups, joined together in regular 3' 5' phosphate di-ester linkages. To each sugar is attached a nitrogenous base, only four different kinds of which are commonly found in DNA. Two of these— adenine and guanine— are purines, and the other two thymine and cytosine-are pyrimidines. A fifth base, 5-methyl cytosine, occurs in smaller amounts in certain organisms, and a sixth, 5-hydroxy-methyl-cytosine, is found instead of cytosine in the T even phages. It should be noted that the chain is unbranched, a consequence of the regular internucleotide linkage. On the other hand the sequence of the different nucleotides is, as far as can be ascertained, completely irregular. Thus, DNA has some features which are regular, and some which are irregular. A

similar conception of the DNA molecule as a long thin fiber is obtained from physico-chemical analysis involving sedimentation, diffusion, light scattering, and viscosity measurements. These techniques indicate that DNA is a very asymmetrical structure approximately 20 A° wide and many thousands of angstroms long. Estimates of its molecular weight currently centre between 5×10^6 and 10^7 (approximately 3×10^4 nucleotides). Surprisingly each of these measurements tend to suggest that the DNA is relatively rigid, a puzzling finding in view of the large number of single bonds (5 per nucleotide) in the phosphate-sugar back bone. Recently these indirect inferences have been confirmed by electron microscopy.



Chemical formula (diagrammatic) of a single chain of deoxyribonucleic acid.
Answer the following questions :

(a) Name the purines present in DNA.

(b) What is the name of the linkage between nucleotides in DNA?

(c) (i) What is backbone of DNA?

(ii) Out of four different kinds of nitrogenous bases which are commonly formed in DNA has been replaced in some organisms.

or

(d) (i) Which component makes DNA chiral?

(ii) Between which carbon atoms of deoxyribose sugars of nucleotide are phosphodiester linkage present?

Continue on next page.....

30. Observe the table in which azeotropic mixtures are given along their boiling points of pure components and azeotropes.

Some Azeotropic Mixtures					
A	B	Minimum Boiling Azeotropes	A	B	Mixture Azeotropes
H_2O H_2O CH_3COCH_3	C_2H_5OH C_3H_7OH CS_2	95.37% 71.69% 67%	373K 373K 329.25K	351.3K 370.19K 319.25K	351.15 350.72 312.30
H_2O	HCl	20.3%	373K	188K	383K
H_2O	HNO_3	68.0%	373K	359K	393.5K
H_2O	$HClO_4$	71.6%	373K	383K	476K

Answer the following questions :

(a) Why do ethanol and H_2O show positive deviation from Raoult's law ?

(b) Why do H_2O and HCI form maximum boiling azeotropes?

(c) (i) What are azeotropes ?

(ii) How are azeotropes separated ?

or

(d) If $p^\circ_A = 450$ mm, $p^\circ_B = 200$ mm, what is mole fraction of A in vapour phase if $x_A = 0.3$ in liquid phase ?

SECTION-E

Directions (Q. No. 31-33) : The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

31. Write various methods of preparation of phenol.

32. Define the following terms :

1. Mole fraction
2. Molality
3. Molarity
4. Normality
5. Percentage
6. ppm

or

State Henry's Law an mention some important applications.

33. Predict the alkenes that would be formed by dehydrohalogenation of the following halides. With sodium ethoxide in ethanol and identity the major alkene.

(i) 1-Bromo-1-methyl cyclohexane

(ii) 2-Chloro-2-methylbutane

(iii) 3-Bromo-2, 2, 3-trimethylpentane

or

Give the preparation of chlorobenzene from benzene diazonium chloride and give its reaction with:

(i) Na

(ii) CH_3Cl is the presence of anhydrous $AlCl_3$

(iii) H_2SO_4

(iv) HNO_3 in the presence of cone. H_2SO_4.

□□□□□□□