

SAMPLE PAPER- (unsolved)

CHEMISTRY (Theory)

Class – XII

Time allowed: 3 hours

Maximum Marks: 70

General Instructions:

- All the questions are compulsory.
 - There are **26** questions in total.
 - Questions **1** to **5** are very short answer type questions and carry **one** mark each.
 - Questions **6** to **10** carry **two** marks each.
 - Questions **11** to **22** carry **three** marks each.
 - Questions **23** is value based question carrying **four** marks.
 - Questions **24** to **26** carry **five** marks each.
 - There is no overall choice. However, an internal choice has been provided in one question of
 - two marks, one question of three marks and all three questions in five marks each. You have
 - to attempt only one of the choices in such questions.
 - Use of calculators is **not** permitted. However, you may use log tables if necessary.
- Give reason. "Ferric chloride preferred over potassium chloride in case of a cut leading to bleeding.
 - Give IUPAC name of $\text{CH}_3 - \text{CH} = \text{C}(\text{CH}_3) - \text{CH}(\text{Br}) - \text{CH}_3$.
 - What is the molecularity of $\text{Cl} \rightarrow \frac{1}{2} \text{Cl}_2(\text{g})$?
 - Arrange the following halides increasing order of reactivity through SN_2 mechanism: CH_3Br , $(\text{CH}_3)_2\text{CHBr}$, $\text{CH}_3\text{CH}_2\text{Br}$, $(\text{CH}_3)_3\text{C Br}$.
 - Why is the pK_b of aniline greater than that of methylamine?
 - Write the mechanism of 2-bromobutane, an optically active compound reacting with aqueous KOH to form a racemic mixture of products.

7. a) Which type of compounds commonly exhibit Schottky defect. Give an example.
b) Why is the window glass of the old buildings thick at the bottom and look milky?
8. a) Define Hardy Schulze rule.
b) How does an increase in temperature affect both physical as well as chemical adsorption?
9. a. Calculate the packing efficiency in fcc crystal.
b. How many octahedral voids are present in fcc crystal?

Or

Differentiate octahedral and tetrahedral voids with examples.

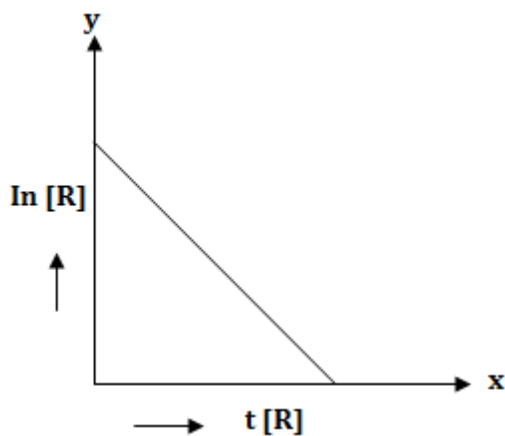
10. a) What are the two components of starch?
b) Differentiate them structurally.
11. If dinitrogen gas is bubbled through water at 293K, how many millimoles of the gas would dissolve in 1 litre of water? The nitrogen gas is at 0.978 atm. Pressure at that temperature. Its Henry's law constant is 7.648×10^4 atm.
12. How ethers are produced from alcohol? Explain the mechanism involved in the above reaction.
13. Account for the following:
(a) The reduction of a metal oxide is easier if the metal formed in liquid state at the temperature of reduction.
(b) The reduction of Cr_2O_3 with Al is thermodynamically feasible, yet it does not occur at room temperature
(c) Pine oil is used in froth floatation method.
14. Chelate therapy is growing interest in treating the problems caused by the presence of metals in toxic proportions in plant and animal systems. The detection of cations through coloured complex formation is done.
a) Name the compound that stops the growth of tumours.
b) What is the alternative medicine for severe kidney damage other than Cis-platin?
c) Give the chelating agents that can remove copper, iron and lead from water.
15. a) Name the method used for refining of (i) Nickel (ii) Zirconium.
b) The extraction of Au by leaching with NaCN involves both oxidation and reduction. Justify giving equations.

16. a) What are the main constituents of Dettol?
b) Why is the use of aspartame limited to cold foods and soft drinks?
c) Give equation for the preparation of non-ionic detergents. Mention the name of their constituents.
17. a) Mention any two ores of Zn, Give a balanced chemical equation in the extraction of Zn from its ore.
b) Explain Van Arkel method for refining zirconium
- Or
- Explain the extraction of Al from pure alumina. Draw the neat diagram of the electrolytic cell involved.
18. (a) What is oil of bitter almonds? How it is prepared?
(b) Why is phenol more acidic than ethanol?
19. a) Which of the following two compounds would react faster by SN2 path way: 1-bromobutane or 2-bromobutane. Give reasons.
b) Why allyl chloride is more reactive than n-propyl chloride towards nucleophilic substitution reaction?
c) Haloalkanes react with KCN to give alkyl cyanide as main product while with AgCN they form isocyanide as main product. Give reason.
20. a) Which will have a higher boiling point 1-chloroethane or 2methyl -2-chlorobutane? Give reason.
b) The p-nitro chlorobenzene undergoes nucleophilic substitution faster than chlorobenzene. Explain by giving the resonating structure.
21. a) What are the consequences of lanthanoid contraction?
b) Why E^0 for Mn^{3+} / Mn^{2+} couple is much more positive than Fe^{3+} / Fe^{2+} ?
22. a) Among CrO_4^{2-} , $Cr(OH)_3$, $Cr(OH)_2$, $Cr_2O_7^{2-}$, which will be give CrO_3 when it is dissolved in aqueous NaOH?
b) Giving reason indicate which one of the following would be coloured.
(i) Cu^+ (ii) Sc^{3+} (iii) Ni^{2+}
23. In class XII, chemistry teacher was discussing with students about vitamins. She was telling that humans, monkeys and guinea pigs do not have the enzymes necessary for the

biosynthesis of vitamin C and so they must include this vitamin in their diet. A student asked few questions to her, try to answer it.

- Name the functional group present in vitamin C.
- Is it acidic or basic in nature?
- Give the common name of vitamin C.
- Name the product formed on its oxidation.
- Give the structure of vitamin C.

24. For a certain chemical reaction variation in the concentration in $[R]$ vs time(S) plot is given below:



- Give the order of the reaction.
- Give the units of rate constant K ?
- Give the relationship between k and $t_{1/2}$ (half-life period)
- What does the slope of the above line indicate?
- Draw the plot $\log [R]_0 / [R]$ vs time $t(s)$

Or

Derive the integrate rate equation for

- First order reaction
- Zero order reaction

25. (a) A blackish brown coloured solid 'A' when fused with alkali metal hydroxides in presence of air, produces a dark green coloured compound 'B' which on electrolytic

oxidation in alkaline medium gives a dark purple coloured compound C. identify A, B, and C and write the reaction involved.

(b) What happens when an acidic solution of the green compound (B) is allowed to stand for some time? Give the equation involved. What is this type of reaction called?

Or

Give reasons for the following:

- a) Transition metals have enthalpies of atomization.
 - b) Among the lanthanoids, Ce(III) is easily oxidized to Ce(IV).
 - c) $\text{Fe}^{3+}|\text{Fe}^{2+}$ redox couple has positive electrode potential than $\text{Mn}^{3+}|\text{Mn}^{2+}$ couple.
 - d) Cu (I) has d^{10} configuration while Cu (II) has d^9 configuration, still Cu (II) is more stable in aqueous solution than copper (I).
 - e) The second and third transition series elements have almost similar atomic radii.
26. a) Out of Ag_2SO_4 , CuF_2 , MgF_2 and CuCl , which compound will be coloured? Give reason.
- b) Explain:
- i. CrO_4^{2-} is a strong oxidizing agent while MnO_4^{2-} is not.
 - ii. Zr and Hf have identical sizes.
 - iii. The lowest oxidation state of manganese is basic while the highest is acidic.
 - iv. Mn(II) shows maximum paramagnetic character amongst the divalent ions of the first transition series.

Or

a) In the titration of FeSO_4 with KMnO_4 in the acidic medium, why is dil. H_2SO_4 used instead of dil. HCl ?

b) Give reasons:

- i. Vanadium pentoxide is a good catalyst.
- ii. Ce^{4+} is used as an oxidizing agent in volumetric analysis.
- iii. Transition metals form a number of interstitial compounds.
- iv. Zn^{2+} salts are white while Cu^{2+} salts are blue.