



SAMPLE PAPER-03 (unsolved)
CHEMISTRY (Theory)
Class - XI

Time allowed: 3 hours

Maximum Marks: 70

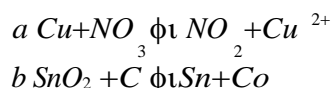
General Instructions:

- a) All the questions are compulsory.
- b) There are **26** questions in total.
- c) Questions **1** to **5** are very short answer type questions and carry **one** mark each.
- d) Questions **6** to **10** carry **two** marks each.
- e) Questions **11** to **22** carry **three** marks each.
- f) Questions **23** is value based question carrying **four** marks.
- g) Questions **24** to **26** carry **five** marks each.
- h) 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.
- i) Use of calculators is **not** permitted. However, you may use log tables if necessary.

1. Express the result of $\frac{3.24 \times 0.08666}{5.006}$ to the appropriate number of significant figures.
2. Which series of lines of the hydrogen spectrum lie in the visible region?
3. State Markownikoff's rule.
4. What is salt bridge?
5. What happens to internal energy of the system if i) work is done on the system ii) Work is done by the system?
6. For the equilibrium $NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$ the value of the equilibrium constant, K_c is 3.75×10^{-6} at 1069 K. Calculate the K_p for the reaction at this temperature.
7. Depict the molecular orbital diagrams of H_2 and F_2^{2+} and predict which one of the two species is more stable.

Or

Balance the following reaction

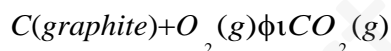


8. Give four characteristic of d-block elements.
9. How many grams of $KClO_3$ must be decomposed to prepare 3.36 litres of oxygen at STP? (Atomic weight of K =39, Cl = 35.5, O =16u)
10. Define the following:
 - i) Ionic radii

- ii) Covalent radii
11. A. Define solubility product.
B. Calculate the pH of the resultant mixture of 10mL of 0.01 M H₂SO₄ and 10 mL of 0.01 MKOH.
12. Describe with the help of chemical equations the following reactions:
- Fridel Craft's alkylation
 - Wurtz reaction
 - Kolbe's electrolysis reaction
13. Give the different postulates of kinetic theory of gases.
14. Discuss the following:
- Thermal stability of alkaline earth metal carbonates.
 - Basic strength of alkaline earth metal hydroxides.
 - Despite its high ionization energy, lithium is strongest reducing agent.
15. A 2.5 L flask contains 0.25 mol each of SO₂ and N₂ gas at 27^o C. Calculate the partial pressure exerted by each gas and also the total pressure exerted by each gas and the total pressure. Name the law on which it is based.

Or

Calculate the free energy change and equilibrium constant of the reaction:



$$\Delta H = -300 \text{ kJ mol}^{-1}, \Delta S = 3 \text{ JK}^{-1} \text{ mol}^{-1} \text{ at } 300 \text{ K.}$$

16. A. What is the oxidation state of Cr in CrO₃?
B. Balance the following ionic equations by ion-electron method:
- $MnO_4^- + SO_3^{2-} + H^+ \rightarrow Mn^{2+} + SO_4^{2-} + H_2O$
 - $CrO_7^{2-} + HS + H^+ \rightarrow Cr^{3+} + S + H_2O$
17. Dr. Uma suggested that pregnant ladies and breast feeding ladies need extra calcium from 1300 - 1500 mg per day. She also explained that the calcium is required for beating of heart, hormonal system, working of brain and for blood coagulation. So Dr. Uma is giving her patients with calcium supplement.
- Does calcium get stored in our body and used for old age?
 - How does a body get calcium?
 - How deficiency in calcium found?
18. Discuss the principle and method of softening of hard water by synthetic ion-exchange resins.
- 19.
- Write any two similarities in properties of Br and Al.
 - How would you convert limestone to calcium carbide?
20. A. Which of the following has dipole moment and why?
2,2-Dimethylpropane, trans-Pent-2-one, cis-Hex-2-ene, 2,2,3,3- Tetra methyl butane
B. Why does -NO₂ group present on benzene ring deactivate and m-directing in electrophilic substitution reaction?
C. What are free radicals? How are they formed?

21. A. State the first law of thermodynamics.

B. The equilibrium constant for the reaction $A \rightleftharpoons B$ is 1.8×10^{-7} at 298 K. Calculate the value of ΔG_0 for the reaction ($R = 8.314 \text{ J/K/mol}$). Predict the feasibility of the reaction under standard states.

22. What happens when:

- Acetylene is passed over red hot tube?
- But-1-ene reacts with O_3 followed by Zn and H_2O ?
- Benzene reacts with CH_3Cl in the presence of $AlCl_3$?

23. A student Kapil accidentally spilled conc. H_2SO_4 on his hand. His friends Vasana asked him to keep his hand under running water and then washed his hand with soap but irritation still persisted. Vasana rubbed paste of solid $NaHCO_3$ on his hand and then washed with water and finally irritation stopped.

- Mention the value shown by Vasana.
- Name one more substance which can be used instead of sodium bicarbonate.
- Write the chemical reaction involved in treatment of burn with sodium hydrogencarbonate.
- Why should we keep hand in running water when concentrated sulphuric acid falls on it?

24.

- A compound 'X' of boron reacts with NMe_3 to give an adduct 'Y'. 'Y' on hydrolysis gives a compound 'Z', an acid and hydrogen gas. Identify the compound 'X', 'Y' and 'Z' with the help of suitable reactions.
- Why there is phenomenal decrease in ionization energy from C to Si.

Or

A tetravalent element 'A' forms monoxide and dioxide with oxygen. When air is passed over heated element at 1273 K, producer gas is obtained. The monoxide of the element is a powerful reducing agent and reduces ferric oxide to iron.

- Write the reactions involved in the formation of producer gas and reduction of ferric oxide with monoxide.
- Identify the element and give its formulae of its dioxide and monoxide.

25.

- Define isomerism.
- What are the various types of isomerism?
- Cite two examples for each.

Or

- Define tautomerism.
- Explain keto-enol tautomerism in aldehydes and ketones.
- What are the conditions under which enol form predominates?

26. Write the notes with suitable examples on

- Inert pair effect
- Allotropy

Or

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- a) The first element in every group of representative elements shows properties different from the characteristic properties of the group. Name three such elements and mention two abnormal properties of each one of them.
- b) Explain the structures of diborane and boric acid.