Sample Paper-02
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.

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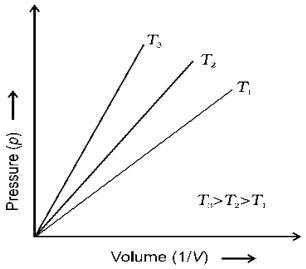
1. What will be the volume of ammonia formed if 2L of nitrogen is mixed with 2L of hydrogen at constant temperature and pressure?
2. Give two examples of state functions.
3. Why the molar enthalpy of vapourisation of acetone is less than that of water?
4. How many electrons are present in 16g of methane?
5. How many grams of Na_2CO_3 should be dissolved to make 100cc of 0.15M Na_2CO_3?
6. Which of these electrons experience lowest effective nuclear charge?
   (a) The Br atom containing 35 electrons in which 6 electrons are in 2p orbital or
   (b) 6 electrons in 3p orbital and 5 electrons in 4p orbital.
7. Write structural formulas of the following compounds :
   (a) 3, 4, 4, 5–Tetramethylheptane
   (b) 2,5-Dimethylhexane

   Or

   Write the structural formula of:
   (a) O-Ethylanisole
   (b) 2,3 - Dibromo -1 - phenylpentane
8. (a) How change in velocity of a moving particle change the wavelength of the particle?
   (b) Give the difference in the angular momentum of an electron present in 3p and 4p orbitals?
9. What is hydride gap? Why is heavy water used in nuclear reactors?
10. Though carbon dioxide is inert and harmless gas, it is thought to be a serious pollutant. Why?

11. (a)Give the importance of measuring BOD of a water body.
    (b) What is desirable concentration of fluoride ion pH of drinking water?
    (c) Give the harmful effect of nitrogen dioxide.
12. (a)Define:
    (i) Intensive properties
    (ii) Adiabatic process
    (b) Derive $\Delta G=-T\Delta S_{total}$ from the relationship G=H – TS.
13. We know that 75% of solar energy reaching the earth, is absorbed by earth's surface increases its temperature. The rest of heat radiates back to the atmosphere. Some of the heat is trapped by gases such as CO, CH_4, O_3, CFC's and water vapours present in the atmosphere. This causes global warming.
    (a) Suggest some measures to decrease CO gas in the atmosphere.
    (b) Give a method to save ozone layer.
    (c) Will the use of solar energy solve our problems? Comment.
14. Comment on the graph below.



15. If the density of 3M solution of NaCl is 1.25g/mL, calculate the molality of the solution.
16. Calculate the standard enthalpy of formation of one mole of CH_3OH (l), if the combustion of one mole of methanol takes place at 298 K and 1 atm and after combustion CO_2 (g) and H_2O (l) are produced and 726 kJ of heat is liberated. Assume that the standard enthalpies of formation of CO_2 (g) and H_2O (l) are - 393 kJ/mol and -286 kJ mol respectively.
17. What are the uses of sodium carbonate?
18. Describe in detail the expanded octet with suitable examples.
19. How would you prepare alkanes from alkenes?
20. (a) Calculate the concentration of hydroxyl ion in 0.1 M solution of ammonium hydroxide having $K_b = 1.8\times10^{-5}$, if K_{sp} value of two sparingly soluble salts Ni $(OH)_2$ and AgCN are 2×10^{-15} and 6.0×10^{-17} respectively.
    (b) Which salt is more soluble?

    Or

    (a) When certain buffer is made by mixing sodium formate and formic acid in water, explain how it neutralizes an addition of a small amount of an acid or a base.
    (b) When a basic buffer is made by mixing ammonium hydroxide and ammonium nitrate in water, explain how it resists change in its pH on addition of a small amount of an acid or a base.
21. Give the names and formulae of the compounds in the statements given below:

(i) A compound of Ca used in setting fractured bones.

(ii) A compound of Mg, S, O and H used as purgative in medicines.

(iii) A compound of Ca and C used for the production of acetylene.

(iv) A compound of Ca, C and N used as fertilizer.

22. 0.45 g of an organic compound gave 0.792 g of CO_2 and 0.324 g of water on combustion. 0.24 g of same substance was Kjeldahlised and the NH_3 formed was absorbed in 50.0 cm^3 of $\frac{M}{8} H_2SO_4$. The excess acid required 77.0 cm^3 of $\frac{M}{8} NaOH$ for complete neutralization. Calculate the empirical formula of the compound.

23. Prasad did not paint his iron gate and so it got corroded. Iron gets rusted in presence of oxygen and moisture and large amount of iron gets wasted due to corrosion. Corrosion is a process in which metals react with compounds present in atmosphere to form surface compounds.

(a) Justify: "Corrosion is an electrochemical phenomenon".

(b) How rusting of iron be prevented?

(c) What happens to the metal which undergoes corrosion?

24. (a) The species H_2O, HCO_3, HSO_4^- and NH_3 can act both as Bronsted acids and bases. For each case give the corresponding conjugate acid and base.

(b) Consider the following endothermic reaction: $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$

(i) Write expression for Kp for the above reaction.

(ii) How will the equilibrium be affected by?

1. Increasing the pressure 2. Using a catalyst

Or

(a) Predict the acidic, basic or neutral nature of the following salt: NaCN, KBr, $NaNO_2$, NH_4NO_3.

(b) How many grams of KBr are added to 1 L of 0.05 M solution of silver nitrate just to start the precipitation of AgBr? Ksp of AgBr = 5.0×10^{-13}

25. With the help of structures, give the IUPAC names of different chain isomers of alkanes corresponding to the molecular formula C_6H_{14}.

Or

The preparation of acetaldehyde by passing mixture of ethene and oxygen under pressure into aqueous solution of $PdCl_2$ and $CuCl_2$ as a catalyst is called Wacker's process. Acetalydehyde is a useful chemical which is used for silvering of mirror. It can be prepared

by various methods. It is used in the commercial preparation of acetic acid, ethyl acetate etc. Paraldehyde, a trimer of aldehyde is used as hypnotic.

(a) Give the best method to prepare acetaldehyde. Give two reasons.

(b) Give the chemical equation for Wacker's process of preparation of acetaldehyde.

(c) Give the disadvantage of preparing it from ethyne.

26. Give the net ionic equation for the reaction of potassium dichromate (VI) with sodium sulphite in an acid solution to give chromium (III) ion and the sulphate ion.

Or

Explain the reason for the following reactions to proceed differently.

$Pb_3O_4 + 8\ HCl \rightarrow 3\ PbCl_2 + Cl_2 + 4\ H_2O$ and

$Pb_3O_4 + 4\ HNO_3 \rightarrow 2\ Pb(NO_3)_2 + PbO_2 + 2\ H_2O$