INDIAN SCHOOL AL WADI AL KABIR
SAMPLE PAPER 2
CHEMISTRY (043) – SET 2 **Maximum Marks: 70**
Class: XII **Time: 3 Hours**

General Instructions:

Read the following instructions carefully.

a) There are 33 questions in this question paper. All questions are compulsory.

b) Section A: Q. No. 1 to 16 are objective type questions. Q. No. 1 and 2 are passage based questions carrying 4 marks each while Q. No. 3 to 16 carry 1 mark each.

c) Section B: Q. No. 17 to 25 are short answer questions and carry 2 marks each.

d) Section C: Q. No. 26 to 30 are short answer questions and carry 3 marks each.

e) Section D: Q. No. 31 to 33 are long answer questions carrying 5 marks each.

f) There is no overall choice. However, internal choices have been provided.

g) Use of calculators and log tables is not permitted.

SECTION A (OBJECTIVE TYPE)

1. Read the passage given below and answer the following questions: (1x4=4)

Solubility of gases in liquids decreases with rise in temperature. When dissolved, the gas molecules are present in liquid phase and the process of dissolution can be considered similar to condensation and heat is evolved in this process. Dissolution process involves dynamic equilibrium and thus must follow Le Chatelier's Principle. As dissolution is an exothermic process, the solubility should decrease with increase of temperature.

The following questions are multiple choice questions. Choose the most appropriate answer:

(i) Which of the following statements is true?

a) The solubility of a solid in liquid always increases with increase in temperature.

b) The solubility of a solid in liquid always decreases with increase in temperature.

c) The solubility of a solid in liquid increases with increase in temperature if dissolution process is endothermic.

d) The solubility of a solid in liquid increases with increase in temperature if dissolution process is exothermic.

(ii) Pressure does not have any significant effect on solubility of solids in liquids because

a) both solids and liquids are highly incompressible.

b) solids are highly incompressible but liquids are compressible.

c) dissolution process is endothermic.

d) dissolution process is exothermic.

OR

Which of the following is the correct equation according to Raoult's law?

a) $P_{total} = p_1^{\ 0} + (p_2^{\ 0} - p_1^{\ 0})\ x_2$

b) $P_{total} = p_1^{\ 0} + (p_2^{\ 0} + p_1^{\ 0})\ x_2$

c) $P_{total} = p_1^{\ 0} + (p_2^{\ 0} - p_1^{\ 0})\ x_1$

d) $P_{total} = (p_2^{\ 0} + p_1^{\ 0})\ x_1$

(iii) Which of the following is the correct statement of Henry's law?

a) mole fraction of gas in the solution is inversely proportional to the partial pressure of the gas over the solution.

b) mole fraction of gas in the solution is proportional to the partial pressure of the gas over the solution.

c) mole fraction of gas in the solution is independent of the partial pressure of the gas over the solution.

d) none of these.

(iv) Low blood oxygen causes climbers to become weak and unable to think clearly, symptoms of a condition known as …….

a) bends

b) edema

c) scurvy

d) anoxia

2. Read the passage given below and answer the following questions: (1x4=4)

Oxygen, sulphur, selenium, tellurium and polonium constitute Group 16 of the periodic table. This is sometimes known as group of chalcogens. The name is derived from the Greek word for brass and points to the association of sulphur and its congeners with copper. Most copper minerals contain either oxygen or sulphur and frequently the other members of the group. Oxygen is the most abundant of all the elements on earth. Oxygen forms about 46.6% by mass of earth's crust. Dry air contains 20.946% oxygen by volume. However, the abundance of sulphur in the earth's crust is only 0.03-0.1%. Combined sulphur exists primarily as sulphates such as gypsum $CaSO_4.2H_2O$, epsom salt $MgSO_4.7H_2O$, baryte $BaSO_4$ and sulphides such as galena PbS, zinc blende ZnS, copper pyrites $CuFeS_2$. Traces of sulphur occur as hydrogen sulphide in volcanoes. Organic materials such as eggs, proteins, garlic, onion, mustard, hair and wool contain sulphur.

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(i) **Assertion:** Oxygen has more negative electron gain enthalpy than sulphur.

Reason: In oxygen, electron is added to smaller 2p sub shell. Hence, electron – electron repulsion is more.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

(ii) **Assertion:** For group 16 elements, stability of +6 oxidation state decreases down the group and stability of +4 oxidation state increases.

Reason: Bonding in +4 and +6 oxidation states are primarily covalent.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

OR

Assertion: H_2O is a liquid while H_2S is a gas.

Reason: Bond dissociation enthalpy decreases on moving down the group.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

(iii) **Assertion:** Acidic character increases from H_2O to H_2Te.

Reason: The increase in acidic character is due to decrease in bond (H–E) dissociation enthalpy, down the group.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct

explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

(iv) **Assertion:** Sulphur hexafluoride, SF_6 is exceptionally stable.

Reason: Lone pair of electrons present on sulphur stabilizes SF_6.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

Following questions (No. 3-11) are multiple choice questions carrying 1 mark each:

3. For the formation of ozone from oxygen

a) ΔH is positive and ΔS_{system} is positive.

b) ΔH is negative and ΔS_{system} is negative.

c) ΔH is negative and ΔS_{system} is positive

d) ΔH is positive and ΔS_{system} is negative

OR

Identify the gases formed when ozone reacts with NO.

a) N_2 and NO_2

b) N_2O and NO_2

c) N_2 and O_2

d) NO_2 and O_2

4. Atoms of element B form hcp lattice and those of the element A occupy half of the tetrahedral voids. What is the formula of the compound?

a) AB

b) AB_2

c) A_2B

d) AB_4

5. What is produced at the cathode when aqueous NaCl is electrolyzed?

a) Sodium

b) Hydrogen

c) Chlorine

d) Oxygen

OR

During the electrolysis of dilute sulphuric acid, which of the following processes takes place at the anode?

a) $2SO_4^{2-}(aq) \rightarrow S_2O_8^{2-}(aq) + 2e^-$

b) $2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-$

c) $H^+(aq) + e^- \rightarrow \frac{1}{2} H_2(g)$

d) $H_2O(l) \rightarrow H^+(aq) + OH^-(aq)$

6. The unit of rate constant for a third order reaction is

a) s^{-1}

b) $mol^2L^{-2}s^{-1}$

c) $mol^{-1}Ls^{-1}$

d) $mol^{-2}L^2s^{-1}$

7. Which of the following is true for Chemisorption?

a) Reversible, high activation energy and increases with increase of temperature.

b) Irreversible, low activation energy and increases with increase of temperature.

c) Irreversible, high activation energy and increases with increase of temperature.

d) Irreversible, high activation energy and decreases with increase of temperature.

OR

Which of the following is an example for an Aerosol?

a) Hair cream

b) Froth

c) Mist

d) Paints

8. The complex ion responsible for brown ring formation in brown ring test is

a) $[Fe(H_2O)_5(NO)]^+$

b) $[Fe(H_2O)_5(NO)]^{2+}$

c) $[Fe(H_2O)_4(NO)_2]^{2+}$

d) $[Fe(H_2O)_5(NO_2)]^{2+}$

9. The magnetic moment of a Cu^{2+} ion in aqueous solution is

a) 0 BM
b) 1.414 BM
c) 1.732 BM
d) 2.828 BM

10. Identify the Grignard reagent which is used to prepare 3-Methylbutan-2-ol from Ethanal.

a) Methyl magnesium bromide
b) Ethyl magnesium bromide
c) Propyl magnesium bromide
d) Isopropyl magnesium bromide

11. Which of the following represents overall folding of the polypeptide chains?

a) Primary structure of proteins
b) Secondary structure of proteins
c) Tertiary structure of proteins
d) Quaternary structure of proteins

OR

The anomeric carbon in glucose is

a) C6
b) C2
c) C1
d) C5

In the following questions (Q. No. 12 - 16) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

12. **Assertion:** Amorphous solids are called pseudo solids or supercooled liquids.

Reason: Like liquids, amorphous solids have the tendency to flow, though very slowly.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

13. **Assertion:** Conductivity always increases with decrease in concentration for both weak and strong electrolytes.

Reason: On dilution, number of ions per unit volume decreases.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

14. **Assertion:** Cooking of rice in an open vessel takes more time at a hill station.

Reason: Due to decrease in atmospheric pressure, water boils at a lower temperature and more heat is required.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

15. **Assertion:** Cu^+ ion is not stable in aqueous solutions

Reason: Second ionization energy of copper is exceptionally high.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

16. **Assertion:** Alkyl iodides undergo S_N2 reaction faster than alkyl chlorides.

Reason: C-I bond is more polar than C-C*l* bond.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

SECTION B

The following questions, Q. No. 17 – 25 are short answer type and carry 2 marks each.

17. Differentiate between Frenkel defect and Schottky defect with the help of examples.

OR

Examine the given defective crystal.

X^+	Y^-	X^+	Y^-	X^+
Y^-	□	Y^-	X^+	Y^-
X^+	Y^-	X^+	□	X^+
Y^-	X^+	Y^-	X^+	Y^-

Answer the following questions:

a) Is the defect stoichiometric or non- stoichiometric?

b) How does this defect affect the density of the crystal?

18. a) Define electroosmosis.

b) Lyophobic colloids are also called irreversible sols. Why?

19. Conductivity of 0·002 M acetic acid is 8×10^{-5} S cm^{-1}. Calculate its molar conductivity.

20. Complete the following equations:

a) $S + H_2SO_4(conc.) \rightarrow$

b) $XeF_2 + H_2O \rightarrow$

OR

Draw the structures of the following:

a) XeF_6

b) $H_2S_2O_8$

21. Write the formulae for the following coordination compounds:

(a) Potassium diaquadioxalatomanganate(II)

(b) Tris(ethane–1,2–diamine)chromium(III) sulphate

22. When one mol of a coordination compound $FeCl_3.6H_2O$ is mixed with excess $AgNO_3$, 3 moles of AgCl is formed. Write:

(a) the structural formula of the complex

(b) IUPAC name of the complex

23. Identify A and B in the following reactions :

(a) $CH_3 - CH = CH_2 \xrightarrow[\text{Peroxide}]{HBr} A \xrightarrow[\text{Acetone}]{NaI} B$

(b) $CH_3 - \underset{\displaystyle Br}{\underset{|}{CH}} - CH_2 - CH_3 \xrightarrow{\text{Alc. KOH}} A \xrightarrow{Br_2} B$

24. Define proteins and classify them on the basis of their molecular shape.

OR

Write chemical equations to prove that glucose contains:

a) five –OH groups

b) a carbonyl group

25. a) What happens when $CH_3 - O - CH_2CH_3$ is heated with HI?

b) Explain the mechanism for dehydration of Ethanol to Ethene.

SECTION C

No. 26-30 are Short Answer Type II carrying 3 marks each.

26. An element exists in bcc lattice with a cell edge of 400 pm. Calculate its molar mass if its density is 8 g cm^{-3}.

OR

Derive the packing efficiency in fcc with the help of a diagram.

27. A solution was prepared by dissolving 5 g of non-volatile solute in 95 g of water. It has a vapour pressure of 23·375 mm Hg at 298 K. Calculate the molar mass of the solute. [Vapour pressure of pure water at 298 K is 23·75 mm Hg]

28. Calculate E^{θ}_{cell} and ΔG^{θ} for the following reaction at 298 K:

$A + B^{2+}$ (0·001 M) $\longrightarrow$ A^{2+} (0·0001 M) + B

[Given: E_{cell} = 2·6805 V, 1 F = 96,500 C mol^{-1}]

29. a) On the basis of CFT, write the electronic configuration for d^5 ion, if $\Delta_o > P$.

b) For the complex $[Cr(CO)_6]$, write the

i) IUPAC name

ii) hybridization

iii) magnetic character and

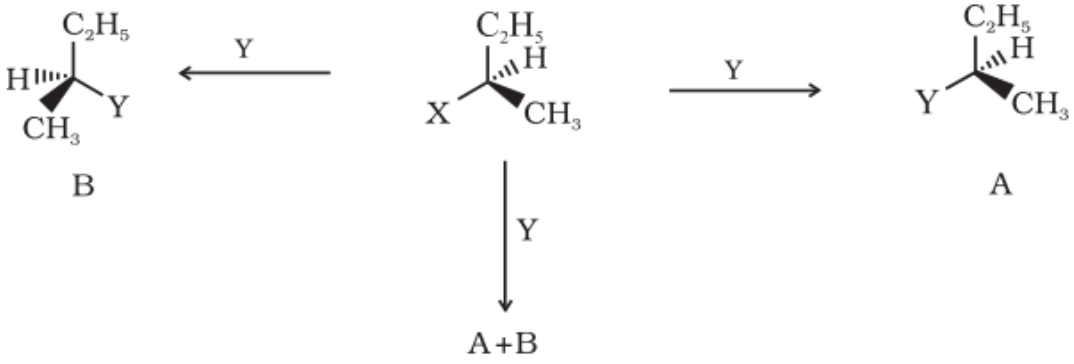
iv) spin of the complex. (At. number: Cr = 24)

30. a) Which would undergo electrophilic substitution faster; Benzene or Chlorobenzene? Why?

b) Which would undergo S_N1 reaction faster; Benzyl chloride or Chlorobenzene? Why?

c) Which of the following compounds would rotate plane polarized light; Pentan-2-ol or Pentan-3-ol. Give reason.

OR



Name the process if,

a) (A) is the only compound obtained.

b) (B) is the only compound obtained.

c) 1:1 mixture of (A) and (B) is obtained.

SECTION D

Q. No 31 to 33 are long answer type carrying 5 marks each.

31. a) A first order reaction is 40 % completed in 50 minutes. Calculate the time required for 80 % completion.

(log 2 = 0.301, log 3 = 0.4771, log 4 = 0.6021, log 5 = 0.699, log 6 = 0.7782)

b) A reaction is second order with respect to A and first order respect to B. How is the rate of this reaction affected when:

i) concentrations of both A and B are doubled.

ii) concentration of A alone is tripled.

OR

a) The following data were obtained for the reaction, $A + 2B \rightarrow C$

Experiment	[A] / $molL^{-1}$	[B] / $molL^{-1}$	Initial rate of formation of C / $molL^{-1}\ s^{-1}$
1	0.2	0.5	1.2×10^{-3}
2	0.2	1.0	4.8×10^{-3}
3	0.6	1.5	1.08×10^{-2}

(i) Find the order of reaction with respect to A and B

(ii) Write the rate law and overall order of reaction.

(iii) Calculate the rate constant (k).

b) Derive the relationship between rate constant and half life for a zero order reaction.

32. How would you account for the following?

(i) The transition metals generally form coloured compounds.

(ii) The E^{θ} value for the Mn^{3+}/Mn^{2+} couple is much more positive than that for Cr^{3+}/Cr^{2+} couple or Fe^{3+}/Fe^{2+} couple.

(iii) The highest oxidation state of a metal is exhibited in its oxide or fluoride.

(iv) Transition metals and their many compounds act as good catalyst.

(v) The enthalpies of atomisation of the transition metals are high.

OR

a) Complete the following reactions:

i) $Cu^{2+} + I^{-} \rightarrow$

ii) $Cu^{+}_{(aq)} \rightarrow$

b) In the following ions:

Ti^{4+}, Cr^{3+}, Fe^{2+}, Ni^{2+}

(i) Which ion is most stable in an aqueous solution?

(ii) Which ion is colourless?

(iii) Which ion has the highest number of unpaired electrons?

33. a) Give reasons:

i) o-nitrophenol has lower boiling point than p-nitrophenol.

ii) Methyl phenyl ether cannot be prepared from bromobenzene.

b) Arrange the following in increasing order of acidity:

Phenol, Ethanol, water

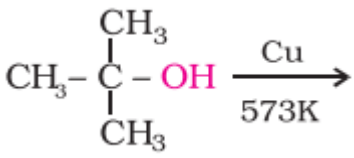
c) Give chemical tests to distinguish between the following pairs of compounds:

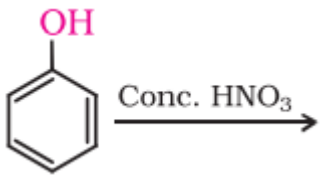
i) n-propyl alcohol and Isopropyl alcohol

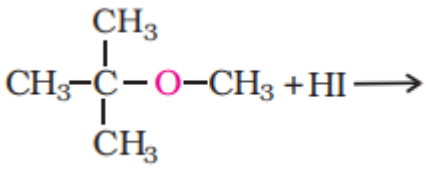
ii) Phenol and Benzyl alcohol.

OR

a) Complete the following reactions

i) 

ii) 

iii) 

b) Convert the following:

i) Phenol to Salicylic acid

ii) Cumene to Benzene

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