

**CBSE  
CLASS – XI  
CHEMISTRY  
SAMPLE PAPER 3**

**Time: 3 Hours****Marks: 70****General Instructions**

- All questions are compulsory.
- Section A: Q.no. 1 to 5 are very short answer questions and carry 1 mark each.
- Section B: Q.no. 6 to 12 are short answer questions and carry 2 marks each.
- Section C: Q.no. 13 to 24 are also short answer questions and carry 3 marks each.
- Section D: Q.no. 25 to 27 are long answer questions and carry 5 marks each.
- There is no overall choice. However an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
- Use of log tables if necessary, use of calculators is not allowed.

**Section A**

1. Arrange the following in the order of decreasing reactivity towards alkenes. [1]  
HCl, HBr, HI, HF
2. Predict the shapes of the following molecules using VSEPR theory? [1]  
BeCl<sub>2</sub>, SiCl<sub>4</sub>

**OR**

What is meant by bond pairs of electrons?

3. Give IUPAC name of allyl alcohol. [1]
4. What is biochemical oxygen demand? [1]

**OR**

What is the name of the compound formed when CO combines with blood?

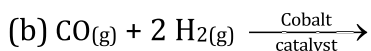
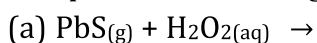
5. Give the colours shown in the flame test by sodium and potassium. [1]

**Section B**

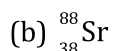
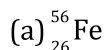
6. How does metallic and nonmetallic character vary on moving from left to right in the periodic table? [2]
7. Arrange the following in increasing order of size. Give reason for your answer. [2]  
 $Mg^{2+}$   $O^{2-}$   $Na^+$   $F^-$   $Al^{3+}$  .
8. Calculate the wavelength of an electron moving with a velocity of  $2.05 \times 10^7 m/s$ .  
(Mass of electron =  $9.1 \times 10^{-31} kg$ ,  $h = 6.63 \times 10^{-34} Js$ ) [2]
9. At 273 K the density of a gaseous oxide at 2 bar is the same as that of nitrogen (Atomic mass = 14u) at 5 bar. Calculate the molar mass of the oxide [2]
10. Consider the reaction of water with  $F_2$  and suggest, in terms of oxidation and reduction, which species are oxidized/ reduced. [2]

**OR**

Complete the following reactions:



11. How many neutrons and protons are there in following nuclei? [2]



12. If density of methanol is 0.793 kg/L, what is its volume needed for making 2.5 L of its 0.25 M solution? [2]

**OR**

The density of 3 M solution of NaCl is 1.25 g/ml. Calculate the molarity of the solution.

**Section C**

13. Calculate the energy associated with the first orbit of  $\text{He}^+$ . What is the radius of this orbit? [3]

**OR**

An element with mass number 81 contains 3.7% more neutrons as compared to protons. Assign the symbol to the element.

14. Element X, Y and Z have 4, 5 and 7 valence electrons respectively. [3]

- Write the molecular formula of the compounds formed by these elements individually with hydrogen.
- Which of these elements will have highest dipole moment?

**OR**

- Which of the two is more stable and why?  $\text{H}_2^+$  or  $\text{H}_2^-$
- All bonds in  $\text{PCl}_5$  are not equal. Explain.
- Which of the two is more ionic and why?  $\text{NaCl}$  or  $\text{NaI}$

15. Give reasons: [3]

- Evaporation causes cooling
- Falling liquid drops are spherical.
- Vapour pressure of acetone is less than that of ether at same temperature.

16. [3]

The combustion of one mole of methanol takes place at 298 K and 1 atm. After combustion  $\text{CO}_2(\text{g})$  and  $\text{H}_2\text{O}(\text{l})$  are produced and 726 kJ of heat is liberated. Calculate the standard enthalpy of formation of one mole of  $\text{CH}_3\text{OH}(\text{l})$ . Standard enthalpies of formation of  $\text{CO}_2(\text{g})$  and  $\text{H}_2\text{O}(\text{l})$  are  $-393 \text{ kJ mol}^{-1}$  and  $-286 \text{ kJ mol}^{-1}$  respectively.

17. How many grams of  $\text{KBr}$  be added to 1 L of 0.05 M solution of silver nitrate just to start the precipitation of  $\text{AgBr}$ ?  $K_{\text{sp}}$  of  $\text{AgBr} = 5.0 \times 10^{-13}$  [3]

**OR**

Consider the following endothermic reaction:



- Write expression for  $K_p$  for the above reaction.
- How will the equilibrium be affected by  
Increasing the pressure  
Using a catalyst?

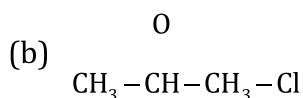
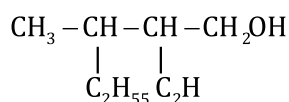
18. Balance the given redox reaction in acidic medium. [3]  
 $\text{MnO}_4^- + \text{SO}_2 \rightarrow \text{Mn}^{2+} + \text{HSO}_4^-$

OR

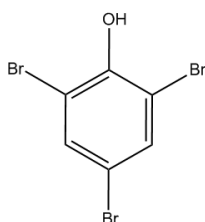
Balance  $\text{P} + \text{HNO}_3 \longrightarrow \text{H}_3\text{PO}_4 + \text{NO}_2 + \text{H}_2\text{O}$  by oxidation number method.

19. [3]  
 (a) Name the class of hydrides to which  $\text{H}_2\text{O}$  and  $\text{NaH}$  belong.  
 (b) What is understood by hydride gap?  
 (c) What do you mean by 15 volume  $\text{H}_2\text{O}_2$  solution?

20. Write the IUPAC names of the following: [3]  
 (a)



(c)



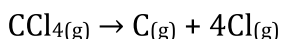
21. What are electrophiles? Explain electrophile substitution reaction with the help of example [3]
22. Comment on each of the following observations: [3]  
 (a) Lithium forms a nitride directly like magnesium. Give equation involved.  
 (b)  $\text{BaO}$  is soluble but  $\text{BaSO}_4$  is insoluble in water.
23. [3]  
 (a) In which C-C bond of  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$ , the inductive effect is expected to be least?  
 (b) What type of isomerism is present in the following pairs?  
 (i)  $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$  and  $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_3$   
 (ii)  $\text{CH}_3\text{CH}_2\text{OH}$  and  $\text{CH}_3\text{OCH}_3$



24. Explain: [3]
- (a) What happens when:
- Quicklime is heated with silica
  - Calcium nitrate is heated
- (b) When is a cation highly polarising? Which alkali metal ion has the highest polarizing power?

### Section D

25. Calculate enthalpy of change for the process: [5]



and calculate bond enthalpy of C-Cl in  $\text{CCl}_4$

Given:  $\Delta_{\text{vap}}H(\text{CCl}_4) = 30.5 \text{ kJ/mol}$

$$\Delta_f H(\text{CCl}_4) = -135.5 \text{ kJ/mol}$$

$$\Delta_a H(\text{C}) = 715.0 \text{ kJ/mol}$$

$$\Delta_a H(\text{Cl}_2) = 242 \text{ kJ/mol}$$

OR

- (a) What is bond energy? Why is it called enthalpy of atomisation?
- (b) Calculate bond energy of C-H bond, given that heat of formation of  $\text{CH}_4$ , heat of sublimation of carbon and heat of dissociation of  $\text{H}_2$  are  $-74.8$ ,  $+719.6$ ,  $435 \text{ kJ/mol}$  respectively.
26. Explain why? [5]
- Boric acid is a monobasic lewis acid.
  - $\text{PbO}_2$  is a stronger oxidizing agent than  $\text{SnO}_2$ .
  - $\text{CO}_2$  is a gas but  $\text{SiO}_2$  is solid at room temperature.
  - $\text{SiF}_6^{2-}$  is known but  $\text{SiCl}_6^{2-}$  is not known.
  - What is inorganic benzene and why it is so called?

OR

When metal X is treated with sodium hydroxide, a white precipitate (A) is obtained, which is soluble in excess of NaOH to give soluble complex (B). Compound (A) is soluble in dilute HCl to form compound (C). The compound (A) when heated strongly gives (D), which is used to extract metal. Identify (X), (A), (B), (C) and (D). Write suitable equations to support their identities.

27. [5]
- (a) Do the following conversions:
- Benzene to p-nitrobromobenzene
  - Ethyl chloride to ethane
- (b) Give mechanism of addition of HBr to propene.

(c) Write a note on Friedel-Crafts alkylation.

**OR**

(a) Out of n-hexane and ethyne which will be more acidic. Also give reason for this behaviour.

(b) Explain with example

(i) Wurtz reaction

(ii) Acidic dehydration

(c) Convert propyne to propanone