



JAIN COLLEGE, Bangalore  
Mock Paper January - 2017  
I PUC – Chemistry (34)

Time: 3 Hours 15 Minutes

Max. Marks: 70

**Instructions:**

1. The question paper has four parts A,B, C, and D. All the parts are compulsory.
2. Write balanced chemical equations and draw labelled diagrams wherever required.
3. Use log tables and simple calculators if necessary (Use of Scientific calculator is not allowed)

**PART – A**

**I. Answer all the following questions: 10 × 1 = 10**

1. State law of definite proportion.
2. Write van der Waals equation for 'n' moles of real gas.
3. Mention the conjugate base of H<sub>2</sub>O .
4. Write the IUPAC name of an element with atomic number 102.
5. Define reduction in terms of electron transfer.
6. What is syn gas?
7. Which alkali metal is the strongest reducing agent?
8. Write the chemical formula of plaster of Paris.
9. Write the IUPAC name of CH<sub>3</sub>CH(CH<sub>3</sub>)CH<sub>2</sub>CH<sub>2</sub>OH
10. Name the catalyst used in Friedel – craft's reaction.

**PART – B**

**II. Answer any FIVE of the following questions. 5 × 2 = 10**

11. Describe the classification of pure substances.
12. a) Write ideal gas equation for n moles of a gas.  
b) Define critical temperature for a gas.
13. What is the shape of BeCl<sub>2</sub> molecule?
14. Give two uses of Lithium .
15. How is diborane prepared from Lithium Aluminium hydride?
16. Define electromeric effect. Give example .
17. Give two tests to distinguish alkanes from alkenes .
18. Explain ozone hole.

**PART – C**

**III. Answer any FIVE questions 5 × 3 = 15**

19. Define Ionisation enthalpy. Discuss the variation in the Ionisation Enthalpy along a period and down the group in the long form of a periodic table.
20. Based on VSEPR theory, explain the structure of ammonia.
21. Write the electronic configuration based on energy level diagram for the molecular orbitals of Lithium (Li<sub>2</sub>) molecule. Calculate its bond order and comment on its magnetic property.
22. Give salient features of MOT.
23. Balance the following chemical equation by half reaction method:  
 $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{Fe}^{2+}(\text{aq}) \rightarrow \text{Fe}^{3+}(\text{aq}) + \text{Cr}^{3+}(\text{aq})$  [ acid medium]
24. Complete the following reactions:  
i)  $\text{Na} + \text{H}_2 \rightarrow \dots\dots\dots$       ii)  $\text{N}_2 + 3\text{H}_2 \rightleftharpoons \dots\dots\dots$
25. What are alkali metals? Give any two general properties.
26. Give reasons: i) Concentrated nitric acid is kept in aluminum container.  
ii) Diamond is a hard and shining substance.  
iii) Silicon forms p- type semiconductors.

**PART – D**

**IV. Answer any FIVE of the following questions:**

**5 × 5 = 25**

27. a) The percentage composition of an organic compound is found to be 39.9% carbon, 6.7% hydrogen and the rest oxygen. If the molecular mass of the compound is 60, determine the molecular formula of the compound.  
b) Define mole. (4+1)
28. a) Write any three observations of Rutherford's atomic model.  
b) State Heisenberg's uncertainty principle. (3+2)
29. a) Write any three differences between orbital and orbit.  
b) Illustrate (n+l) rule by taking 4s and 3d orbitals as example. (3+2)
30. a) On a ship sailing in Pacific Ocean where temperature is 300K, a balloon is filled with 3L of air. What will be the volume of the balloon when the ship reaches Indian Ocean, where the temperature is 310K?  
b) What is compressibility factor (Z)? What is its value for an ideal gas? (3+2)
31. a) Calculate the standard free energy change for a reaction at 298K. The equilibrium constant for a reaction is 50.  
b) i) Write the Gibbs equation and explain the terms in it.  
ii) Define Entropy. What is its value for perfect crystalline solid? (3+2)
32. a) Calculate Enthalpy of formation of methane from the following data:  
 $C(s) + O_2(g) \rightarrow CO_2(g)$ ,  $\Delta H = -393.5$  kJ  
 $H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l)$ ,  $\Delta H = -285.83$  kJ  
 $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ ,  $\Delta H = -890$  kJ.  
b) Define the term Enthalpy of combustion. (4+1)
33. a) State Le Chatelier's principle. Discuss the effect of concentration, temperature and pressure on the following equilibrium.  
 $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ ;  $\Delta H = -Q$  kJ  
b) Write the expression  $K_p$  for the following reaction:  
 $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$  (3+2)
34. a) Derive the expression for ionization constant of a weak acid.  
b) Explain Lewis concept of acids and bases. (3+2)

**V. Answer any TWO of the following**

**2 × 5 = 10**

35. a) Explain functional isomerism with an example.  
b) Write any two differences between Inductive effect and Electromeric effect.  
c) Name the method used to separate the liquids with smaller difference in boiling points (2+2+1)
36. a) Describe Duma's method for the estimation of nitrogen.  
b) How do you detect sulphur using Lassaigne's extract. (3+2)
37. a) Discuss the mechanism of Nitration of benzene.  
b) What is the action of chlorine on Benzene in the presence of sunlight? Give equation. (3+2)