0123 **SET -**

Total No. of Questions - **33**
Total No. of Printed Pages - **3**

Regd. No. | | | | | | | | | | |

Part - III

CHEMISTRY, Paper - I

(English Version)

MODEL Paper - I

(For the Academic Year 2021-22 only)

Time : **3 Hours** ***Max. Marks :*** **60**

SECTION - A **10 × 2 = 20**

Note: (i) Answer **ANY TEN** Questions
(ii) Each Question carries **TWO** marks
(iii) All are very short answer type questions.

1. Among $N^{-3}, O^{-2}, F^{-}, Na^{+}, Mg^{+2}$ *and* Al^{+3}
   a. What is common in them ?
   b. Arrange them in the increasing ionic radii.
2. An element 'X' has atomic number 34. Give its position in the periodic table.
3. Write Lewis dot structures for S and S^{2-}
4. Cl^{-} ion is more stable than Cl atom—Why?
5. How many Sigma and Pi bonds are present in (a) C_2H_2 and (b)C_2H_4?
6. Which of the gases diffuses faster among N_2 , O_2 and CH_4? Why?
7. Give the relation between the partial pressure of a gas and its mole fraction.
8. Calculate the number of molecules present in 1.12×10^{-7} c.c. of a gas at STP (c.c.- cubic centimeters = cm^3).

9. $C_{(graphite)} + O_{2(g)} \rightarrow CO_{2(g)}$

For the above reaction what is the internal energy change, ΔU ?

10. What is meant by ionic product of water ?

11. Lithium salts are mostly hydrated. Why?

12. What happens when magnesium metal is burnt in air?

13. Write the outer electron configuration of group-14 elements.

14. Diamond has high melting point – explain.

15. Write the reagents required for conversion of benzene to methyl benzene.

SECTION - B **6 × 4 = 24**

Note: (i) Answer **ANY SIX** questions.
(ii) Each question carries **FOUR** marks.
(iii) All are of short answer type questions.

16. What is a nodal plane? How many nodal planes are possible for 2p- and 3d- orbitals?

17. Assign the position of the element having outer electronic configuration.

a. $ns^2np^4 (n = 3)$ b. $(n-1)d^2ns^2 (n = 4)$

18. Explain the hybridization involved in PCl_5 molecule.

19. Deduce (a) Boyle's law and (b) Charle's law from Kinetic gas equation.

20. Derive Ideal gas equation.

21. What volume of CO_2 is obtained at STP by heating 4 g of $CaCO_3$?

22. Balance the following redox reactions by ion – electron method:

MnO_4^- (aq) + SO_2 (g) $\rightarrow$ Mn^{2+} (aq) + HSO_4^- (aq)

(in acidic solution)

23. Explain extensive and intensive properties.

24. Classify the species $AlCl_3$, NH_3, Mg^{+2} and H_2O into Lewis acids and Lewis bases and justify your answer ?

25. Derive the relation between K_p and K_c for the equilibrium reaction

$$N_2\,(g) + 3H_2\,(g) \rightleftharpoons 2NH_3\,(g)$$

26. Write a note on heavy water.

27. Write a short note on the anomalous behaviour of boron in the group – 13.

28. Explain the difference in properties of diamond and graphite on the basis of their structure.

29. Complete the following reaction and name the products A,B and C.

$$CaC_2 \xrightarrow{H_2O} A \xrightarrow{\text{hot metal tube}} B \xrightarrow{Al\,Cl_3 + CH_3Cl} C$$

SECTION - C **2 × 8 = 16**

Note: (i) Answer any **ANY TWO** questions.
(ii) Each question carries **EIGHT** marks.
(iii) All are long answer type questions.

30. How are the quantum numbers n, l and m_l arrived at? Explain the significance of these quantum numbers.

31. Define IE_1 and IE_2. Why is $IE_2 > IE_1$ for a given atom? Discuss the factors that effect IE of an element.

32. 'What do you understand by Hybridisation? Explain different types of hybridization involving s and p orbitals.

33. How does acetylene react with the following reagents? Give the corresponding equations and name the products formed in the reactions.

a. Acetic acid b. Water c. Hydrogen d. Halogens
e. Hydrogen halide f. Ammonical $AgNO_3$ and Cu_2Cl_2