

**NOTE:** Attempt all questions of Section-A by filling the corresponding bubble on the MCQ ANSWER SHEET and return it to the Superintendent within given time, even if you have not attempted any question.

**SECTION-A**

Time: 20 Minutes

Marks: 18

- Hydration depends upon ..... A) charge density of cation, B) size of cation,  both A&B, D) none
- Conjugate acid base pair concept is based on ..... A) Lewis concept, B) Arrhenius concept,  Lowery-Bronsted concept, D) all of these
- A homogenous reaction is .....  single phase, B) double phase, C) triple phase, D) none of these
- The unit of Avogadro number is ..... A)  $1 \times 6.022 \times 10^{23}$ , B)  $\text{mole}^{-1}$ ,   $6.023 \times 10^{23}$ , D) kg/mol
- Which one is a colloidal solution? A) gold, B) halwa,  silicagel, D) soap
- A catalyst works by changing the reaction path through ..... A) increasing energy of reactants, B) decreasing energy of reactants,  decreasing activation energy, D) none
- No work is done at constant ..... A) pressure,  volume, C) temperature, D) mass
- The oxidation state of Cr in  $\text{K}_2\text{CrO}_4$  is ..... A) +3, B) +6,  +7, D) -6
- Solubility product (ksp) of substance depends upon .....  temperature, B) volume, C) concentration, D) none
- A specie formed from an acid by the loss of proton is called ..... A) acid,  conjugate base, C) conjugate acid, D) arrhenius acid
- Which one of the following is Lewis acid? A)  $\text{BF}_3$ , B)  $\text{AlCl}_3$ , C)  $\text{Ag}^+$ ,  all of these
- Energy of activated complex is always higher than ..... A) product, B) reactants, C) activation energy,  all of these
- Relative lowering of vapour pressure depends upon only .....  mole fraction of solute, B) nature of solute, C) temperature, D) none
- In the Down's cell during electrolysis of molten NaCl, the substance produced at anode is ..... A) sodium, B) oxygen, C) chlorine, D) hydrogen
- Which of the following set of four quantum number is possible for an electron in 3rd orbital?  
A)  $n=3, \ell=1, m=3, s=+\frac{1}{2}$ , B)  $n=3, \ell=2, m=3, s=-\frac{1}{2}$ , C)  $n=3, \ell=2, m=5, s=+\frac{1}{2}$ ,  
D)  $n=3, \ell=2, m=7, s=+\frac{1}{2}$
- If central atom has 2 lone pair and 2 bond pair, the shape of molecule will be ..... A) trigonal,  angular, C) linear, D) square planer
- For limiting reactant, all the following statements are true except ..... A) reactants produce more product, B) reactants completely consume,  must be in stoichiometric amount, D) reactants consumed early
- Which pair are isomorph of each other? A)  $\text{K}_2\text{Cr}_2\text{O}_7$  and  $\text{KCrO}_4$ , B)  $\text{ZnO}$  and  $\text{CO}_2$ , C)  $\text{KNO}_3$  and  $\text{NaNO}_3$ , D) all of these

11191  
CHEMISTRY  
PART-I

Time: 2 Hours 40 Minutes

SECTION-B

Marks: 40

1. Attempt any ten of the following. All carry equal marks.

- i. Why absolute zero temperature is not attainable practically?
- ii. Hydrogen diffuses 6 times faster than unknown gas X. Find mass of gas X.
- iii. Size of molecule affects the strength of London dispersion forces. Elaborate.
- iv. Differentiate between isomorphism and polymorphism.
- v. Prove that  $k_p = k_n$
- vi. The sum of  $P_{ka}$  and  $P_{kb}$  is always equal to 14. Discuss.
- vii. Calculate the number of hydrogen atoms in 180 gram of  $C_6H_{12}O_6$ .
- viii. Why a very small amount of catalyst may be sufficient to carry out a chemical reaction?
- ix. Why a solution has lower vapour pressure than pure solvent?
- x. Balance the following equations by ion electron method:  
(i)  $Sn^{2+} + I_2 \rightarrow Sn^{4+} + I^-$     (ii)  $CN^- + MnO_4^- \rightarrow CNO^- + MnO_2$
- xi. Derive unit of gas constant in  $dm^3 \text{ mm of Hg mol}^{-1} \text{ K}^{-1}$
- xii. Why dipole-dipole forces are much stronger than London dispersion forces?
- xiii. How concentration and nature of reactants affects the rate of reaction?

SECTION-C

Marks: 27

NOTE: Attempt any three of the following questions. All questions carry equal marks.

2. i. Define Charle's law. Derive its mathematical expression and unit of Charle's law constant.  
ii. At  $17^\circ\text{C}$ , a sample of  $H_2$  gas occupies  $125\text{cm}^3$ . What would be the volume at  $100^\circ\text{C}$ .  
(Pressure remain constant)
3. i. Define and explain the term viscosity of a liquid.  
ii. What are the factors affecting the viscosity of liquid?  
iii. How viscosity can be measured and derive its unit.
4. i. State and explain first law of thermodynamics.  
ii. Calculate the work done associated with expansion of gas from  $50\text{dm}^3$  to  $68\text{dm}^3$  at constant pressure of 10 atm.  
iii. Enthalpy of neutralization of strong acids and strong basis always has the same value. Discuss.
5. Write notes on the following:  
i. Common ion effect    ii. Discovery of electron    iii. Ionic solids