

Sign & Stamp of Supdtr:

Roll No.

C No. 62

Name:

SECTION-A

Marks:18

Time Allowed: 20 Minutes

- The process of fusion refers to:
A. melting of a solid into liquid B. condensation C. freezing D. sublimation
- In dynamic equilibrium between liquid and vapor: 126234
A. evaporation stops completely B. condensation stops completely C. evaporation and condensation occur at equal rates D. only condensation occurs
- Solids have a definite shape and volume because their particles:
A. move freely B. have weak intermolecular forces C. are held at fixed positions by strong intermolecular forces D. have large empty spaces
- The ability of a crystal to break along specific smooth surfaces is called:
A. habit B. symmetry C. polymorphism D. cleavage
- The open structure of ice is mainly due to:
A. ionic bonding B. metallic bonding C. hydrogen bonding between water molecules D. Van der Waals forces only
- The arrow used to represent a reversible reaction is:
A. $\rightarrow$ B. $\leftarrow$ C. $\rightleftharpoons$ D. $\nrightarrow$
- In writing an equilibrium constant expression, the concentration of each substance is written as:
A. atomic number B. molecular weight C. square brackets D. temperature
- Basic buffer solution consists of:
A. NH_4OH and NH_4Cl B. CH_3COOH and CH_3COONa C. NaOH and NaCl D. HCl and H_2SO_4
- The salt which does not undergo salt hydrolysis is:
A. NaCl B. Na_2CO_3 C. NH_4Cl D. CH_3COONa
- A rate equation shows the relationship between:
A. concentration and reaction rate B. temperature and pressure C. colour and concentration D. mass and volume
- When a non-volatile solute is added to a solvent, the vapour pressure of the solvent:
A. decreases B. increases C. remains unchanged D. becomes zero
- During an exothermic reaction, the temperature of the surroundings usually:
A. decreases B. increases C. remains constant D. becomes zero
- Reduction is a chemical reaction which involves:
A. loss of electrons B. gain of electrons C. loss of protons D. gain of protons
- Actual yield is also known as: 126234
A. calculated yield B. experimental yield C. expected yield D. ideal yield
- Applying Hund's rule, the electrons in the three 2p orbitals of nitrogen are arranged as:
A. $\uparrow\downarrow \uparrow _$ B. $\uparrow\uparrow\uparrow$ C. $\uparrow\downarrow\uparrow _$ D. $\uparrow\downarrow \uparrow$
- The stronger bond among the following:
A. Pi bond B. ionic bond C. Sigma bond D. double hydrogen bond
- When two atoms with different electronegativities form a covalent bond, the shared electrons are:
A. equally shared B. transferred completely C. pulled by the more electronegative atom D. lost by both atoms
- In Graham's law, the symbol r represents:
A. radius of a gas molecule B. rate of diffusion of a gas molecule C. density of gas molecule D. volume of gas molecule

Write Roll No. in the boxes and shade the appropriate circle.

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Shade the correct answer for each question below

- ☒ A ☐ B ☐ C ☐ D
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Section "D"

Marks: 40

Note: Attempt any TEN questions. All questions carry equal marks.

- Q.1 Consider the balanced equation: $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$ 1+1+2
- a) Define conversion factor. b) Write the mole ratio between KClO_3 and O_2 .
c) Calculate the moles of O_2 produced when 4 moles of KClO_3 decompose.
- Q.2 What is meant by actual yield? 15 g of a product is actually obtained during a chemical reaction. The percentage yield of the reaction is 75%. Calculate the theoretical yield of the reaction. 1+3
- Q.3 Write the formula for the radius and energy of an electron in the n th orbit of hydrogen atom. 1+1+1+1
- Calculate the energy of electron in the first orbit ($n=1$) and second orbit ($n=2$).
- Q.4 Write any four assumptions of valence bond theory. 1+1+1+1
- Q.5 Explain step by step how Boyle's law, Charles's law, and Avogadro's law together lead to the formulation of the ideal gas equation. 1+1+1+1
- Q.6 Define pressure and state it mathematically. Name any two units used for measuring pressure. 1+1+1+1
- Q.7 Define boiling point. What are the main events that occur at the boiling point? Why does the boiling point of a liquid change with external pressure? 1+1+2
- Q.8 Define the apparent and absolute expansion of liquids. Describe the expansion of liquids when temperature increases using the kinetic molecular theory. 1+1+2
- Q.9 Why is it difficult to compare the strengths of strong acids like HClO_4 , HI and strong bases like Na_2O , NaNH_2 in aqueous solutions? 2+2
- Q.10 What is the catalyst and homogeneous catalysis? Explain its important types with suitable examples. 1+1+2
- Q.11 What is solvation and hydration? Describe the process of dissolution of an ionic compound in a polar solvent. 1+1+2
- Q.12 Define the term state function. Name four thermodynamic quantities that are state functions. 2+2
- Q.13 Define an electrolytic cell. Explain the working of an electrolytic cell, mentioning the general electrolyte solution and the two half-cell reactions taking place at the two electrodes. 1+1+1+1

Section "C"

Marks: 27

Note: Attempt any THREE questions. All questions carry equal marks

- Q.14 a). Define bond length. How is it determined experimentally? Explain why the calculated bond length of HCl molecules is greater than the experimentally observed value. Also mention the calculated and actual values of bond lengths. 1+1+2+1
- b). Write the four uses of X-rays. 1+1+1+1
- Q.15 a). Differentiate between amorphous and crystalline solids in terms of: 1+1+1+1+1
- (i) shape (ii) melting point (iii) anisotropy (iv) symmetry (v) cleavage plane
- b) (i). What is partial pressure? When is Dalton's law of pressure applied? 1+1+2
- (ii) The total pressure of a gas mixture is 800 mmHg. If the partial pressure of oxygen is 300 mmHg, calculate the partial pressure of nitrogen.
- Q.16 a). State Le-Chatelier's Principle. Explain the effects of change in concentration 2+1.5+1.5
- on the following chemical equilibria:
- (i) $2\text{HI}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{I}_2(\text{g})$
- (ii) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$
- b). Write the stepwise reactions of sublimation, ionization, dissociation, and electron affinity steps, involved in the formation of NaCl in the Born-Haber cycle. 1+1+1+1
- Q.17 a). (i). What is molality? Write its mathematical expression. 1+1+3
- (ii) Calculate the molality of a solution containing 18 g of glucose dissolved in 100 g of water.
- b). (i). State Faraday's first law of electrolysis mathematically. 2+2
- (ii) Calculate the mass of substance (W) deposited when a current (I) of 2 A is passed for 30 minutes. (Electrochemical equivalent $Z = 0.001 \text{ g/C}$)