

Chemistry

PR – XI (A-I-BP7) (26)

۱۔ ہر سوال کے سامنے چار دائرے دیئے گئے ہیں۔ صرف صحیح جواب والا دائرہ بھریں۔

۲۔ دائروں کو شیڈ (بھرنے) کے لیے نیلے یا کالے رنگ کا پین استعمال کریں۔

۳۔ جواب میں ایک سے زائد دائرے بھرنے سے جواب غلط تصور ہوگا۔

Time: 20 Min

SECTION-A

Marks: 18

- 1) When ice melts, the density of water increases because:
☐ Molecules stop moving
☒ Open hydrogen bonded structure collapses
☐ Covalent bonds break ☐ New atoms are formed
- 2) At equilibrium the rate of forward reaction compared to reverse reaction is:
☐ Greater ☐ Smaller ☐ Zero ☒ Equal
- 3) The species which appear in the numerator of the equilibrium constant expression are:
☐ Reactants ☐ Catalysts ☒ Products ☐ Solvents
- 4) The pH of gastric juice is:
☐ 7.4 ☐ 6.5 ☒ 1.2 ☐ 1.5
- 5) The salt which produces a basic solution due to hydrolysis is:
☒ Na_2CO_3 ☐ NH_4Cl ☐ KCl ☐ NaNO_3
- 6) In a multi-step reaction, the rate determining step refers to the step that:
☐ Occurs the fastest
☐ Determines the colour of products
☒ Is the slowest and controls the overall rate
☐ Produces the largest amount of product
- 7) The best semi-permeable membrane, for high molecular mass solutes in water is a firm of:
☒ Cellulose nitrate ☐ Cellulose sulphate
☐ Cellulose phosphate ☐ Cellulose carbonate
- 8) The endothermic reaction is:
☐ Reaction of hydrogen with iodine
☐ Reaction of methane with oxygen
☒ Reaction of hydrogen and oxygen
☐ Reaction of nitrogen with hydrogen
- 9) The substance which is oxidized in the reaction

$\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$, is:

☐ Cu^{2+}

☐ Cu

☒ Zn

☐ Zn^{2+}

10) For the reaction, $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ is 44g but only 35.2 g CO_2 is produced, the percent yield is:

☐ 75%

☒ 80%

☐ 85%

☐ 90%

11) According to Hund's rule, electrons occupy degenerate orbitals:

☐ In pairs first

☐ Randomly

☒ Singly with parallel spins before pairing

☐ With opposite spins immediately

12) Hydrogen chloride molecule is formed between one H and one Cl atoms by overlap of:

☐ 1s of H & 2p of Cl

☐ 2s of H & 2p of Cl orbitals

☒ 1s of H & 2s of Cl orbitals

☐ 1s of H & 3p of Cl

13) The bond which is purely covalent with no ionic character is:

☐ HCl

☐ HF

☒ Cl_2

☐ NH_3

14) According to Graham's law, if the molar mass of a gas increase, its rate of diffusion will:

☐ Increase

☒ Decrease

☐ Remain constant

☐ Become zero

15) The unit commonly used for molar heat of fusion is:

☐ J

☒ kJ mol^{-1}

☐ mol kJ^{-1}

☐ J g^{-1}

16) The pair of processes which occurs simultaneously in equilibrium between liquid and vapor is:

☐ Melting and freezing

☐ Diffusion and effusion

☒ Evaporation and condensation

☐ Sublimation and deposition

17) According to kinetic molecular theory, the kinetic energy of particles in solids is:

☐ Very high

☒ Low compared with liquids and gases

☐ Equal to gases

☐ Infinite

18) Two different substances having similar crystal structures are said to show:

☐ Polymorphism

☒ Isomorphism

☐ Allotropy

☐ Anisotropy

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Note: Time allowed for Section-B and Section-C is 2 Hours and 40

minutes.

SECTION-B

Q2: Answer any TEN parts. Each part carries FOUR marks.

1. The reaction is: $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$.
(a) Write two possible mole ratios from the equation
(b) How many moles of Fe will be produced from 2 moles of Fe_2O_3 ?
2. In a reaction: $2\text{Al} + \text{Cl}_2 \rightarrow 2\text{AlCl}_3$, the amount of aluminum chloride obtained is 36g and the percentage yield is 90%. Calculate the theoretical yield.
3. An electron in hydrogen atom moves from $n=3$ to $n=1$.
(a) Calculate the energy of electron in both orbits using Bohr's energy equation.
(b) State whether energy is absorbed or released during this transition.
4. Predict the shape of BeCl_2 (beryllium chloride) using VSEPR theory. Explain how the number of electron pairs around the central atom determine its geometry.
5. 75 cm^3 of a gas at 30 mm Hg and 50°C is heated until the volume of a gas is 200 cm^3 at pressure 70 mm Hg. What is the final temperature of the gas?
6. A barometer reads a pressure of 3.21 atm. Calculate the corresponding pressure in: (a) torr (b) Pascal
7. Liquids with stronger intermolecular forces have higher boiling points, viscosities, and surface tensions but lower vapour pressures. Explain this with valid justification.
8. What is the kinetic energy? How does kinetic energy influence the movement and collisions of molecules in liquids?
9. What is the leveling and differentiating solvent? Give one example of each.
10. Define heterogeneous catalysis. Explain the role of nickel as a catalyst in the hydrogenation reaction between ethene and hydrogen to form ethane. Also write the chemical equation.
11. Define solvation and hydration. Name the types of intermolecular forces involved between solutes and solvents in the following solvation processes.
(i) polar ionic solutes in polar solvents
(ii) non-polar covalent solutes in non-polar solvents

12. A container contains 50 g of water. Calculate its heat capacity. (The specific heat capacity of water is $4.184 \text{ J g}^{-1}\text{K}^{-1}$).
13. Define standard electrode potential. How is the standard electrode potential of zinc electrode measured using the Standard Hydrogen Electrode?

SECTION-C

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

- Q3 (a) What is bond length? How is it measured? Discuss the three possible reasons for the difference between calculated bond length and experimental bond length with examples.
(b) Write any four properties and any two uses of X-rays.
- Q4 (a) Define crystalline and amorphous solids with examples. Why do crystalline solids have definite shape while amorphous solids do not? Give reason.
(b) (i) State Dalton's law of pressure. Give a suitable example.
(ii) A gaseous mixture contains 12% NH_3 , 28% N_2 , and 60% H_2 . If the total pressure is 40 atm, find the partial pressure of each gas.
- Q5 (a) State Le-Chatelier's Principle. Consider the reaction:
$$\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}$$
Apply Le-Chatelier's Principle to predict the effect of increasing pressure and concentration on ammonia formation.
(b) Calculate the lattice energy of NaBr using the following data in kJmol^{-1} . ($\Delta H_f = -360.1$, $\Delta H_s = +109$, $\Delta H_{1E} = +496$, $\Delta H_{D4} = +192.5$ and $\Delta H_{E.A} = -334.7$)
- Q6 (a) List and define any five different units of concentration used for expressing solution concentration.
(b) State Faraday's first law of electrolysis and express it mathematically. Define the terms used in its mathematical expression.