Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A

SWL-1-24

Q.1	Questions	A	B	C	D
1.	Orbitals having same energy are called:	Degenerate orbitals	Valence orbitals	d-orbitals	s and p orbitals
2.	Amorphous solids:	Can possess small regions of orderly arrangement of atoms	Have sharp melting point	Have perfect arrangement of atoms	Undergo clean cleavage when cut with knife
3.	Halogen that exists as solid at room temperature is:	F_2	Cl_2	Br_2	I_2
4.	The order of rate of diffusion of gases NH_3, SO_2, Cl_2 and CO_2 is:	$NH_3 > SO_2 > Cl_2 > CO_2$	$Cl_2 > SO_2 > CO_2 > NH_3$	$NH_3 > CO_2 > Cl_2 > SO_2$	$NH_3 > CO_2 > SO_2 > Cl_2$
5.	What is the most abundant form of matter around us on our earth.	Gas	Liquid	Solid	Plasma
6.	How many steps are involved in complete quantitative characterization?	2	3	4	5
7.	Which of the given is used as decolourizing agent in crystallization?	Graphite	Animal Charcoal	H_2SO_4	KOH
8.	Which of the given is a mono isotopic element?	Fluorine	Chlorine	Silver	Calcium
9.	The largest number of molecules are present in:	4.8g of C_2H_5OH	3.6g of H_2O	2.8g of CO	5.4g of NO
10.	If salt bridge is not used between two half cells then the voltage:	Decreases slowly	Drops to zero	Decreases rapidly	Does not change
11.	The rate of reaction:	Decreases as the reaction proceeds	Increases as the reaction proceeds	Remains the same as the reaction proceeds	May decrease or increase as the reaction proceeds
12.	A solution of glucose is 10 % w/v. The volume in which its one g.mole is dissolved will be:	1 dm^3	1.8 dm^3	200 cm^3	900 cm^3
13.	Which of the given is weak acid?	HCl	H_2SO_4	CH_3COOH	HNO_3
14.	One calorie is equal to:	0.4184 J	41.84 J	418.4 J	4.184 J
15.	Which of the given species has unpaired electrons in antibonding molecular orbitals?	O_2^{2-}	B_2	N_2^{2-}	F_2
16.	Molecular shape of SO_3 according to VSEPR Theory:	Triangular Planner	Linear	Pyramidal	Tetrahedral
17.	Visible range contains wave length in between:	200-400 n.m	400-750 n.m	200-800 n.m	800-1200 n.m

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Note:- Section B is compulsory. Attempt any THREE questions from Section C.

SECTION-B

2. Write short answers to any EIGHT parts. (8 x 2 = 16)

i. Why 23 g of sodium and 238 g of uranium have equal number of atoms in them?   ii. Define gram formula giving one example.

iii. Write down two characteristics of plasma.   iv. What do you mean by partition chromatography? Give Example.

v. Define sublimation and name at least two sublimed solids.   vi. How can rate of filtration be increased by flutted filter paper?

vii. How does values of equilibrium constant (Kc) help predict extent of a reaction?   viii. Why lighter gases diffuse more rapidly than heavier ones?

ix. How are acidic and basic buffers prepared? Give one example in each case.   x. State Charle's law of gases. Give its mathematical form.

xi. Differentiate between reversible and irreversible reactions with examples.   xii. How Mg-atom is twice heavier than that of carbon atom? Explain.

3. Write short answers to any EIGHT parts. (8 x 2 = 16)

i. Boiling needs constant supply of heat. Give reason.   ii. How chloroform and acetone are miscible with each other?

iii. How does liquid crystals act as temperature sensors?   iv. Why Molecular solids are soft and easily compressible?

v. What is the reason for production of positive rays?   vi. Differentiate between Zeeman and Stark effect.

vii. Give two points for the significance of Moseley's law.   viii. Why boiling points of solvents increase due to the presence of solutes?

ix. What do you mean by Heterogeneous catalysis? Give two examples.   x. Draw the shapes of 's' and 'p' orbitals.

xi. Rate of a reaction is everchanging parameter under the given conditions. Justify it.   xii. Define "Hydrolysis". Give two examples.

4. Write short answers to any SIX parts. (6 x 2 = 12)

i. Write down the electrode reactions in alkaline battery.   ii. Define dipole moment. Give its various units.   iii. What is pressure-volume work?

iv. Why do the ionization energies of elements decrease down the group of periodic table although the nuclear charge increases?

v. The abnormality of bond length in HI is less prominent than that of HCl. Give the reason.   vi. Why is MOT superior to VBT?

vii. Define standard enthalpy of a reaction. Give an example.   viii. Differentiate between exothermic and endothermic reactions.

ix. SHE acts as anode when connected with Cu electrode but as cathode when connected with Zn electrode. Give the reason.

SECTION-C: Note: Attempt any THREE questions. Each question carries EIGHT (08) marks.   (8x3=24)

5. (a) What are Ions? Give their different types. Under what conditions these can be generated? (4)
   (b) Name the factors affecting the "London Forces". Explain the boiling points of halogens in detail. (4)

6. (a) Calculate the density of $CH_4(g)$ at 0°C and 1 atm pressure.   (b) How $\frac{e}{m}$ value of electron is measured? (4+4)

7. (a) Define and explain co-ordinate covalent bond with three examples. (4)
   (b) What is the percentage ionization of acetic acid in a solution in which 0.1 moles of it has been dissolved per dm³ of the solution (Ka of acetic acid=1.85x10⁻⁵) ? (4)

8. (a) Describe in detail the measurement of enthalpy of combustion with the help of Bomb Calorimeter with diagram. (1+3=4)
   (b) Define primary storage cell. Explain silver oxide battery in detail. (1+1+2=4)

9. (a) What is Raoult's Law? Explain it with three statements also. (4)
   (b) Define order of reaction. Name various methods for its determination and explain only half life method in detail. (4)

211-324-1A-17000

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SECTION-A

SWL-2-24

Q.1	Questions	A	B	C	D
1.	The quantum number which gives information about degeneracy of orbitals in space is:	Principal quantum number	Azimuthal quantum number	Magnetic quantum number	Spin quantum number
2.	The molecules of CO_2 in dry ice form:	Ionic crystals	Covalent solids	Molecular solids	Metallic solids
3.	Acetone and Chloroform are soluble in each other due to:	Hydrogen bonding	Ion-dipole forces	Instantaneous dipole	London dispersion forces
4.	The partial pressure of oxygen in the air is:	116 torr	200 torr	159 torr	150 torr
5.	The drying agent used in vacuum desiccator is:	Benzoic acid	Glucose	Silical gel	Animal charcoal
6.	Solvent extraction is an equilibrium process and is controlled by:	Law of mass action	The amount of solvent	Distribution law	The amount of solute
7.	The molar volume of CO_2 is maximum at:	S.T.P	127 °C and 1 atm	0 °C and 2 atm	273 °C and 2atm
8.	The number of moles of CO_2 which contain 8.0g of oxygen is:	0.25	0.50	1.0	1.50
9.	The empirical formula of glucose is:	CHO	$C_6H_{12}O_6$	C_2HO	CH_2O
10.	The reduction potential of Zinc electrode is:	0.76 volt	−0.76 volt	−0.34 volt	0.34 volt
11.	The catalyst used in the decomposition of $KClO_3$ is:	$CuCl_2$	V_2O_5	MnO_2	NO
12.	The molal boiling point constant is the ratio of the elevation in boiling point to:	Molarity	Mole fraction of solvent	Molality	Mole fraction of solute
13.	The pH of human blood is maintained at:	7.0	7.35	4.0	14.0
14.	For a given process, the heat changes at constant pressure (q_p) and at constant volume (q_v) are related to each other as:	$q_p = q_v$	$q_p < q_v$	$q_p > q_v$	$q_p = \dfrac{q_v}{2}$
15.	Which of the hydrogen halides has the highest percentage of ionic character?	HCl	HBr	HF	HI
16.	C_2H_4 (ethene) shows hybridization:	sp^3	sp^2	sp	dsp^2
17.	The wave number of the light emitted by a certain source is 2×10^6 m^{-1}. The wavelength of this light will be:	500 nm	500 m	200 nm	5×10^7 m

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Note:- Section B is compulsory. Attempt any THREE questions from Section C.

SECTION-B

2. **Write short answers to any EIGHT parts.** (8 x 2 = 16)

   i. Define Avogadro's number with a suitable example.   ii. Write down two assumptions of stoichiometry.

   iii. Many chemical reactions involve limiting reactant as taking place in our surrounding. Justify.

   iv. Why is crystallization a better technique for separation and purification?   v. Name any four sublimed solids.

   vi. What is R_f value? Also write down its formula.   vii. Deduce Boyle's law with the help of Kinetic theory of gases.

   viii. Write down any four applications of plasma.   ix. How does buffer act?

   x. The plot of PV versus P is a straight line at constant temperature and with a fix number of moles of an ideal gas. Explain.

   xi. How does equilibrium constant (K_c) predict direction of a reaction?   xii. Give optimum conditions to get maximum yield of Ammonia (NH_3).

3. **Write short answers to any EIGHT parts.** (8 x 2 = 16)

   i. What are liquid crystals? Write down their any two uses.   ii. Evaporation causes cooling, why?

   iii. Define Anisotropy. Give example.   iv. Ionic crystals are highly brittle, why?

   v. Write down any two properties of neutrons.   vi. What is stark effect?

   vii. What is meant by dual nature of matter?   viii. Define spin quantum number.

   ix. What is percentage weight / weight? Give example.   x. Non ideal solutions do not obey Roults' law, why?

   xi. What is heterogeneous catalysis? Give example.   xii. Define energy of activation.

4. **Write short answers to any SIX parts.** (6 x 2 = 12)

   i. Why atomic radius cannot be measured precisely?   ii. Size of an anion is always larger than its parent atom. Justify.

   iii. Why is the second electron affinity of oxygen positive?   iv. Why He_2 does not exist under normal conditions.

   v. Why is it necessary to mention physical states of reactants and products in thermo chemical equation?

   vi. Define internal energy with one example.   vii. Calculate oxidation number of Cr in $K_2Cr_2O_7$.

   viii. Write down importance of standard hydrogen electrode.   ix. Define heat and work.

SECTION-C: Note: Attempt any THREE questions. Each question carries EIGHT (08) marks.   (8 x 3 = 24)

5. (a) What is meant by combustion analysis? Draw neat diagram. Also write down formulas to calculate percentages of carbon and hydrogen.   (1+1+2)

   (b) What are ionic solids? Write down any six properties of ionic solids.   (1+3)

6. (a) Calculate the mass of 1 dm³ of NH_3 gas at 30 °C and 1000 mmHg pressure considering that NH_3 is behaving ideally.   (4)

   (b) Write down any eight properties of cathode rays.   (4)

7. (a) Write down four postulates of VSEPR theory.   (4)

   (b) The solubility product of Ag_2CrO_4 is 2.6×10^{-2} at 25 °C. Calculate the solubility of the compound.   (4)

8. (a) State first law of thermodynamics. How will you prove that work done by the system is negative ($W = -P\Delta V$).   (4)

   (b) What is electrochemical series? Explain the following application in detail: (1+3)

   (i) Comparison of the relative tendency of metals and non metals to get oxidized or reduced.

9. (a) Explain Beckmann method for the measurement of freezing point depression with diagram.   (3+1)

   (b) Define order of reaction. Give one example of first order, second order and third order reaction.   (1+1+1+1)