

PAPER CODE = 6485 *CHR-11-1-23*

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	The study of heat changes accompanying a chemical reactions is known as : (A) Electrochemistry (B) Physical chemistry (C) Analytical chemistry (D) Thermochemistry
2	Which of the following has hydrogen bonding : (A) $CH_4$ (B) $CCl_4$ (C) $NH_3$ (D) $NaCl$
3	An excess of aqueous silver nitrate is added to aqueous barium chloride and precipitate is removed by filtration. What are the main ions in the filtrate : (A) $Ag^+$ and $Ba^{2+}$ and $NO_3^-$ (B) $Ag^+$ and $NO_3^-$ only (C) $Ba^{2+}$ and $NO_3^-$ only (D) $Ba^{2+}$ and $NO_3^-$ and $Cl^-$
4	Mass in grams of 2.74 moles of $KMnO_4$ : (A) 0.715 g (B) 1416.2 g (C) 432.92 g (D) 294 g
5	The unit of the rate constant is the same as that of the rate of reaction in : (A) Zero Order Reaction (B) First Order Reaction (C) Second Order Reaction (D) Third Order Reaction
6	Splitting of spectral lines when atoms are subjected to strong electric field is called : (A) Stark effect (B) Zeeman effect (C) Photoelectric effect (D) Compton effect
7	The partial pressure of oxygen in air is : (A) 116 torr (B) 159 torr (C) 110 torr (D) 160 torr
8	Isotopes differ in : (A) Arrangement of electrons in orbitals (B) Properties which depend upon mass (C) Chemical properties (D) The extent to which they may be affected in electromagnetic field
9	Calorie is equivalent to : (A) 0.4184 J (B) 4.184 J (C) 41.84 J (D) 418.4 J
10	Stronger the oxidizing agent, greater is the : (A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of cell
11	Which of the following hydrogen halides has the highest percentage of ionic character : (A) HF (B) HCl (C) HBr (D) HI
12	Pressure remaining constant, at which temperature the volume of a gas will become twice of what it is at $0^\circ C$ : (A) $546^\circ C$ (B) $200^\circ C$ (C) 546 K (D) 273 K
13	Cathode in Nickel Cadmium cell is : (A) Zn (B) $NiO_2$ (C) Cd (D) $Ag_2O$
14	Ionic solids are characterized by : (A) Low melting points (B) High vapour pressures (C) Good conductivity in solid state (D) Solubility in polar solvents
15	Solvent extraction is an equilibrium process and is controlled by : (A) Law of mass action (B) Distribution law (C) The amount of solvent used (D) The amount of solute
16	The optimum pressure in ammonia synthesis by Haber's process is : (A) 100 – 400 atm (B) 250 – 400 atm (C) 200 – 300 atm (D) 150 – 450 atm
17	A solution of glucose is 10% w/v. The volume in which 1 g mole of it is dissolved will be : (A) $1 dm^3$ (B) $200 cm^3$ (C) $900 cm^3$ (D) $1.8 dm^3$

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2. Write short answers to any EIGHT (8) questions :

16

- (i) Define percentage yield give example.
- (ii) How many moles of  $\text{CO}_2$  can be produced from burning one mole of octane mass of octane is 114?
- (iii) Calculate mass in grams of 2.74 mole of  $\text{KMnO}_4$ .
- (iv) How do you differentiate between diffusion and effusion?
- (v) Gases show non ideal behaviour at low temperature and high pressure, give reason.
- (vi) What is Avogadro's law of gases? Give example.
- (vii) Write electronic configuration of  $\text{Cu}_{29}$  and  $\text{K}_{19}$
- (viii) Why positive rays are also called as canal rays?
- (ix) Why oxygen molecule is paramagnetic in nature?
- (x) Define state function, give example.
- (xi) Justify that heat of formation of a compound is the sum of all the other enthalpies.
- (xii) What is a spontaneous process? Give two examples.

3. Write short answers to any EIGHT (8) questions :

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- (i) What is difference between qualitative and quantitative analysis?
- (ii) Define sublimation. Write name of two compounds which can be sublimed.
- (iii) Write two uses of chromatography.
- (iv) What are intermolecular forces of attraction? Give two examples.
- (v) Evaporation causes cooling. Give reason.
- (vi) Diamond is hard and an electrical insulator. Give reason.
- (vii) Differentiate between hydration and hydrolysis.
- (viii) The concentration in terms of molality is independent of temperature but molarity depends upon temperature. Give reason.
- (ix) Justify that the boiling point of one molal urea solution is  $100.52^\circ\text{C}$  but the boiling point of two molal urea solution is less than  $101.04^\circ\text{C}$ .
- (x) Define homogeneous catalysis. Give one example.
- (xi) Justify that the radioactive decay is always a first order reaction.
- (xii) Differentiate between rate and rate constant of a reaction.

4. Write short answers to any SIX (6) questions :

12

- (i) Define bond order. Give one example.
- (ii) Differentiate between bonding molecular orbital and antibonding molecular orbital.

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4. (iii) The radius of an anion is always larger than parent atom. Why?
- (iv) How does the equilibrium constant of a reaction tell us the direction of a chemical reaction?
- (v) How can NaCl be purified by common ion effect?
- (vi) What are  $pK_a$  and  $pK_b$ ? How do they show the acidic and basic strength?
- (vii) What is the function of salt bridge in galvanic cell?
- (viii) What is anodized aluminium?
- (ix) Calculate the oxidation state of Mn in  $KMnO_4$  and  $K_2MnO_4$

### SECTION - II

**Note :** Attempt any THREE questions.

5. (a) Define the following terms with examples :
- (i) Relative atomic mass (ii) Molecular ion (iii) Isotope (iv) Molar volume. 1,1,1,1
- (b) A sample of nitrogen gas is enclosed in a vessel of volume  $380 \text{ cm}^3$  at  $120^\circ\text{C}$  and pressure of  $101325 \text{ Nm}^{-2}$ . This gas is transferred to a  $10 \text{ dm}^3$  flask and cooled to  $27^\circ\text{C}$ . Calculate the pressure in  $\text{Nm}^{-2}$  exerted by the gas at  $27^\circ\text{C}$ . 4
6. (a) Describe four properties of the crystalline solids. 4
- (b) What is bomb calorimeter and describe it with the help of diagram? 4
7. (a) Derive the equation to calculate radius of electron in  $n$ th orbit hydrogen atom by using Bohr's model. 4
- (b) The solubility of  $\text{PbF}_2$  at  $25^\circ\text{C}$  is  $0.64 \text{ g dm}^{-3}$ . Calculate  $K_{sp}$  of  $\text{PbF}_2$ . 4
- At. Mass of Pb = 207  
At. Mass of F = 19
8. (a) Define atomic orbital hybridization. How can we describe the geometry of  $\text{NH}_3$  on its basis? 4
- (b) What is lead accumulator battery? Discuss its discharging process. 4
9. (a) Discuss Raoult's law when one component is volatile other is non-volatile. 4
- (b) Describe half life method and method of large excess for finding the order of reaction. 2,2

Roll No \_\_\_\_\_ (To be filled in by the candidate) (Academic Sessions 2019 – 2021 to 2022 – 2024)

**CHEMISTRY** 223-1<sup>st</sup> Annual-(INTER PART – I) Time Allowed : 20 Minutes

Q.PAPER – I ( Objective Type ) GROUP – II Maximum Marks : 17

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Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	Which of the following is a pseudo solid : (A) $\text{CaF}_2$ (B) Glass (C) $\text{NaCl}$ (D) $\text{KCl}$
2	The number of bonds in nitrogen molecule is : (A) One $\sigma$ and two $\pi$ (B) One $\sigma$ and one $\pi$ (C) Three sigma only (D) Two sigma and one $\pi$
3	Molarity of pure water is : (A) 1 (B) 18 (C) 55.5 (D) 6
4	Photochemical reactions are : (A) Zero Order Reaction (B) First Order Reaction (C) Second Order Reaction (D) Third Order Reaction
5	The largest number of molecules are present in : (A) 3.6 g of $\text{H}_2\text{O}$ (B) 4.8 g of $\text{C}_2\text{H}_5\text{OH}$ (C) 2.8 g of $\text{CO}$ (D) 5.4 g of $\text{N}_2\text{O}_5$
6	The pH of $10^{-3}$ mol $\text{dm}^{-3}$ of an aqueous solution of $\text{H}_2\text{SO}_4$ is : (A) 3.0 (B) 2.7 (C) 2.0 (D) 1.5
7	The comparative rates at which the solutes move in paper chromatography depend on : (A) The size of the paper (B) $R_f$ values of solutes (C) Temperature of the experiment (D) Size of the chromatographic tank used
8	The quantity of heat required to change the temperature of a body by 1 Kelvin is known as : (A) Heat energy (B) Enthalpy (C) Heat capacity (D) Heat of a reaction
9	Electroplating is done by one of the following methods : (A) Hydration (B) Hydrolysis (C) Electrolytic conduction (D) Electrolysis
10	All gases can be liquefied by the Lind's method, except : (A) $\text{N}_2$ (B) $\text{O}_2$ (C) $\text{F}_2$ (D) He
11	The number of moles of $\text{CO}_2$ which contain 8 g of oxygen : (A) 0.25 (B) 0.50 (C) 1.0 (D) 1.50
12	When 6d orbital is complete, the entering electron goes into : (A) 7f (B) 7s (C) 7p (D) 7d
13	The existence of an element in more than one crystalline forms is known as : (A) Polymorphism (B) Allotropy (C) Symmetry (D) Anisotropy
14	For a given process, the heat changes at constant pressure $q_p$ and $q_v$ at constant volume are related to each other as : (A) $q_p = q_v$ (B) $q_p < q_v$ (C) $q_p > q_v$ (D) $q_p = \frac{q_v}{2}$
15	The molar volume of $\text{CO}_2$ is maximum at : (A) S.T.P (B) $127^\circ\text{C}$ and 1 atm. (C) $0^\circ\text{C}$ and 2 atm. (D) $273^\circ\text{C}$ and 2 atm.
16	Purification of $\text{NaCl}$ by passing $\text{HCl}$ gas is the example of : (A) Filtration (B) Sublimation (C) Ionic product (D) Common ion effect
17	If the salt bridge is not used between two half cells, then the voltage : (A) Decreases rapidly (B) Decreases slowly (C) Does not change (D) Drops to zero

SECTION – I LHR-11-2-23

2. Write short answers to any EIGHT (8) questions : 16

- (i) Why isotopes have same chemical properties but different physical properties?
- (ii) Define gram atom and gram molecule.
- (iii) Define stoichiometry, give its assumptions.
- (iv) Derive mathematical relationship for density of an ideal gas.
- (v) Why pilots feel uncomfortable in breathing at higher altitude?
- (vi) What are causes of deviation from ideality?
- (vii) What happens when a free neutron decay?
- (viii) Define Hund's rule and Aufbau principle.
- (ix) Define Mosley law. Give its importance.
- (x) Define enthalpy of solution. Give one example.
- (xi) Define internal energy and enthalpy.
- (xii) Why enthalpy of combustion of some compounds can not be measured directly?

3. Write short answers to any EIGHT (8) questions : 16

- (i) How crystals are dried by reliable method?
- (ii) Define sublimation. Give the importance of sublimation.
- (iii) Differentiate between adsorption and partition chromatography.
- (iv) The boiling point of water is different at Murree hills and at Mount Everest. Give reason.
- (v) Describe crystallographic elements.
- (vi) The electrical conductivity of the metals decreases by increasing temperature.
- (vii)  $Na_2SO_4 \cdot 10H_2O$  shows discontinuous solubility curve. Give reason.
- (viii) Define molarity. Give one example.
- (ix) Freezing points are depressed due to the presence of solutes.
- (x) Define energy of activation. What is the affect of temperature on the activation energy of a reaction?
- (xi) What is half life period? How it is used for the determination of order of a reaction?
- (xii) The rate of a chemical reaction is an ever changing parameter under the given conditions.

4. Write short answers to any SIX (6) questions : 12

- (i) On what factors bond energy depends?
- (ii) Draw molecular orbital diagram of oxygen molecule.

(Turn Over)

(2)

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4. (iii) Why ionic bonds are non-directional?
- (iv) Define buffer capacity.
- (v) State law of mass action.
- (vi) What is meant by percentage ionization of acids?
- (vii) A salt bridge maintains electrical neutrality in the cell. How?
- (viii) What is meant by electrolytic conduction?
- (ix) Calculate oxidation number of "P" in  $Na_2PO_4$ .

### SECTION - II

**Note :** Attempt any THREE questions.

5. (a) Define types of yield. How do we calculate the percentage yield of a chemical reaction? 4
- (b) Calculate the mass of  $1 \text{ dm}^3$  of  $NH_3$  gas at  $30^\circ C$  and  $1000 \text{ mm Hg}$  pressure, considering ammonia is behaving ideally. 4
6. (a) What are metallic solids? Describe their properties. 4
- (b) Explain spontaneous and non spontaneous reactions describe four points which differentiate them. 4
7. (a) Derive the formula to calculate the energy of an electron in  $n$ th orbit using Bohr's model. 4
- (b) The solubility of  $CaF_2$  in water at  $25^\circ C$  is found to be  $2.05 \times 10^{-4} \text{ mol dm}^{-3}$ . What is the value of  $K_{sp}$  at this temperature? 4
8. (a) Explain  $SP^2$ -hybridization with suitable example. 4
- (b) Give four applications of electro-chemical series. 4
9. (a) Describe Beckmann's method for the measurement of freezing point depression with the help of diagram. 4
- (b) What is enzyme catalysis? Give one example. Also give any four characteristics of enzyme catalysis. 4