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

CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

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

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) $CC\ell_4$ (C) NH_3 (D) $NaC\ell$
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 $C\ell^-$
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) $HC\ell$ (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 °C : (A) 546 °C (B) 200 °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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CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 2.40 hours

PAPER – I (Essay Type) GROUP – I Maximum Marks : 68

SECTION – I LHR-11-1-23

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

(i) Define percentage yield give example.

(ii) How many moles of 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 $KMnO_4$.

(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 Cu_{29} and 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 : **16**

(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 °C but the boiling point of two molal urea solution is less than 101.04 °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.

4. (iii) The radius of an onion 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 cm^3 at 120 °C and pressure of 101325 Nm^{-2}. This gas is transferred to a 10 dm^3 flask and cooled to 27 °C. Calculate the pressure in Nm^{-2} exerted by the gas at 27 °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 nth orbit hydrogen atom by using Bohr's model. 4

(b) The solubility of PbF_2 at 25 °C is $0.64\ g\ dm^{-3}$. Calculate K_{sp} of 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 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

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CHEMISTRY 223-1st Annual-(INTER PART – I) Time Allowed : 20 Minutes

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

PAPER CODE = 6484 CHE-11-2-23

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	Which of the following is a pseudo solid : (A) CaF_2 (B) Glass (C) NaCℓ (D) KCℓ
2	The number of bonds in nitrogen molecule is : (A) One σ and two π (B) One σ and one π (C) Three sigma only (D) Two sigma and one π
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 H_2O (B) 4.8 g of C_2H_5OH (C) 2.8 g of CO (D) 5.4 g of N_2O_5
6	The pH of 10^{-3} mol dm^{-3} of an aqueous solution of H_2SO_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) N_2 (B) O_2 (C) F_2 (D) He
11	The number of moles of 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 CO_2 is maximum at : (A) S.T.P (B) 127 °C and 1 atm. (C) O °C and 2 atm. (D) 273 °C and 2 atm.
16	Purification of NaCℓ by passing 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

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PAPER – I (Essay Type) GROUP – II Maximum Marks : 68

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 Everst. Give reason.

(v) Describe crystallographic elements.

(vi) The electrical conductivity of the metals decreases by increasing temperature.

(vii) $Na_2SO_4.10H_2O$ 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)

 LHR-11-2-23

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 dm^3 of NH_3 gas at 30 °C and 1000 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 nth orbit using Bohr's model. 4

(b) The solubility of CaF_2 in water at 25 °C is found to be $2.05\times10^{-4}\ mol\ dm^{-3}$. 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