1124 **Warning:- Please write your Roll No. in the space provided and sign** **Roll No----------**

(Inter Part – I) **(Session 2020-22 to 2023-25)** **Sig. of Student ----------**

Chemistry (Objective) **(Group - I)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2485** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper**, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) The Cathodic reaction in the electrolysis of dil. H_2SO_4 with Pt electrode is
(A) Reduction ● (B) Oxidation (C) Both reduction and Oxidation (D) Neither oxidation nor reduction

2) Catalyst for a catalyst is also called
(A) Promotor ● (B) Inhibitor (C) Poisoning (D) Retarder

3) 27 g of $A\ell$ will react completely with how much mass of O_2 to produce $A\ell_2O_3$
(A) 8 gm of oxygen (B) 16 gm of oxygen (C) 32 gm of oxygen (D) 24 gm of oxygen ●

4) The mass of one mole of electron is
(A) 1.008 mg (B) 0.55 mg ● (C) 0.184 mg (D) 1.673 mg

5) The comparative rates at which the solute moves in paper chromatography, depends on
(A) The size of paper (B) R_f values of solute ● (C) Temperature of the experiment (D) Size of chromatographic tank used

6) During the process of crystallization, the hot saturated solution
(A) Is cooled very slowly to get large size crystals (B) Is cooled at a moderate rate to get medium sized crystals ● (C) Is evaporated to get the crystals of the product (D) Is mixed with an immiscible liquid

7) The molar volume of CO_2 is maximum at
(A) STP (B) 127°C and 1atm ● (C) 0°C and 2atm (D) 273°C and 2atm

8) Which of the following will have same number of molecules at STP
(A) 280 cm^3 of CO_2 and 280 cm^3 of N_2O ● (B) 11.2 dm^3 of O_2 and 32g of O_2 (C) 44g of CO_2 and 11.2 dm^3 of CO_2 (D) 28g of N_2 and 5.6 dm^3 of oxygen

9) Acetone and chloroform are soluble into each other due to
(A) Intermolecular hydrogen bonding ● (B) Ion dipole interaction (C) Instantaneous dipole (D) Hydrolysis

10) Which of the following pair do not show isomorphism
(A) $NaNO_3$, KNO_3 (B) $ZnSO_4$, $NiSO_4$ (C) Cu , Ag (D) NaCl , $CuCl_2$ ●

11) Which of the following sub-atomic particle do not show ionization
(A) Electron (B) Proton (C) Neutron ● (D) Alpha ray

12) When 6d orbital is complete, the entering electron goes into
(A) 7f (B) 7s (C) 7p ● (D) 7d

13) The type of hybridization in molecule of ethene ($CH_2 = CH_2$) is
(A) sp (B) sp^3 (C) sp^2 ● (D) dsp

14) Which of the following compounds possess ionic bonding
(A) CaO ● (B) CH_4 (C) CH_3Cl (D) C_2H_6

15) The change in heat energy of a chemical reaction at a constant temperature and pressure is called
(A) Enthalpy change ● (B) Bond energy (C) Heat of sublimation (D) Internal energy

16) For which system, does the equilibrium constant (K_c) has units of $(Concentration)^{-1}$
(A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (B) $H_2 + I_2 \rightleftharpoons 2HI$ (C) $2NO_2 \rightleftharpoons N_2O_4$ ● (D) $2HF \rightleftharpoons H_2 + F_2$

17) Colligative properties are the properties of
(A) Dilute solutions which behaves as nearly ideal solutions ● (B) Concentrated solutions which behaves as nearly non-ideal solutions (C) Both A and B (D) Neither A nor B

1124 (Inter Part - I) **Warning**:- Please, do not write anything on this question paper except your **Roll No.**

Chemistry (Subjective) **(Session 2020-22 to 2023-25) Group (I) Paper (I)**

Time Allowed: 2.40 hours **Section ---------- I** **Maximum Marks: 68**

2. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Calculate percentage of phosphorus and Nitrogen in $(NH_4)_2HPO_4$

(ii) 10g of Magnesium and 5g of Carbon have equal number of atoms. Justify.

(iii) Define Stoichiometry. Give its basic conditions.

(iv) Differentiate between Qualitative and Quantitative analysis.

(v) Write down method to separate iodine from its aqueous solution.

(vi) How cooling can be done for Crystallization? (Any two methods)

(vii) Water vapours don't behave ideally at 273 K . Explain with reason.

(viii) Calculate the value of "R" in ideal gas equation. (Any units)

(ix) Give characteristics of Plasma. **(x)** Calculate the pH of 10^{-4}mol.dm^{-3} of $Ba(OH)_2$

(xi) Write down K_c units for the following reaction $PCl_{5\,(g)} \rightleftharpoons PCl_{3\,(g)} + Cl_{2\,(g)}$

(xii) Explain that a Mixture of NH_4OH and NH_4Cl gives us a basic buffer.

3. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Why diamond is hard and electrical insulator.

(ii) Heat of sublimation of substance is greater than it's heat of vaporization, give it's reason.

(iii) What are Debye forces. **(iv)** What is effect of temperature and surface area on evaporation.

(v) Calculate mass of electron from it's charge and e/m value.

(vi) How does neutron interact with $^{14}_{7}N$ and $^{65}_{29}Cu$

(vii) e/m value of positive rays depends on nature of gas which is used in discharge tube, explain it.

(viii) Differentiate between Zeeman effect and Stark effect.

(ix) Differentiate between molarity and molality. **(x)** Justify that aqueous solution of NaCl is neutral.

(xi) What is catalytical poisoning. **(xii)** Differentiate between homogenous catalysis and heterogenous catalysis.

4. Answer briefly any Six parts from the followings:- **6 × 2 = 12**

(i) Write down the cause of chemical combination. **(ii)** Why atoms have no sharp boundary?

(iii) Why lone pair of electrons occupies more space than a bond pair?

(iv) Bond angle in NF_3 shrinks to 102° why? **(v)** What is meant by internal energy?

(vi) Define standard enthalpy of formation. Give example.

(vii) Define standard enthalpy of reaction. Give example.

(viii) Calculate oxidation number of Cr in Cr_2O_3.

(ix) A porous plate or a salt bridge is not required in lead storage cell. Why?

Section -------- II

Note: Attempt any three questions. **(8 × 3 = 24)**

5. **(a)** What is Stoichiometry? Give its assumptions? Mention two important Laws, which help to perform the Stoichiometric calculations?

(b) Define ionic solids. Discuss Any six properties of ionic solids in detail.

6. **(a)** A sample of Krypton with a volume of 6.25 dm^3, a pressure of 765 torr and a temperature of 20 °C is expanded to a volume of 9.55 dm^3 and a pressure of 375 torr. What will be its final temperature in °C

(b) Explain Millikan's oil drop experiment to determine the charge of an electron.

7. **(a)** Discuss sp^2-hybridization with example of ethene.

(b) Calculate the pH of a buffer solution in which 0.11 molar CH_3COONa and 0.09 molar acetic acid solution are present. K_a for CH_3COOH is 1.85×10^{-5}

8. **(a)** Define Hess's law of constant heat summation. How the enthalpy of formation of CO can be calculated with it.

(b) Describe fuel cell in detail with diagram.

9. **(a)** Explain the terms Molarity and Molality with their formulas.

(b) Write four characteristics of Enzyme catalysis.

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(Inter Part – I) (Session 2020-22 to 2023-25) Sig. of Student ----------

Chemistry (Objective) (Group - II) Paper (I)

Time Allowed:- 20 minutes **PAPER CODE 2488** **Maximum Marks:- 17**

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper**, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

1) The molal boiling point constant is the ratio of the elevation in boiling point to
(A) Molarity (B) Molality ● (C) Mole fraction of solvent (D) Mole fraction of solute

2) During a redox reaction, an oxidizing agent
(A) gains electrons ● (B) is oxidized (C) loses electrons (D) Is hydrolyzed

3) If the rate equation of a reaction $2A + B \longrightarrow$ Products is Rate = K[A][B], and A is present in large excess, then order of reaction is
(A) 2.5 (B) 3 (C) 1.5 (D) 1 ●

4) One dm^3 of N_2 at S.T.P contains about
(A) 5.37×10^{22} atoms (B) 3.01×10^{23} atoms (C) 6.02×10^{23} atoms (D) 2.68×10^{19} atoms ●

5) The number of moles of CO_2 which contain 8.0g of oxygen is
(A) 0.25 ● (B) 0.50 (C) 1.0 (D) 1.50

6) The molar volume of CO_2 is maximum at
(A) STP (B) 127°C and 1atm ● (C) 0°C and 2atm (D) 273°C and 2atm

7) A real gas obeying Vander Waals equation will resemble ideal gas if
(A) Both 'a' and 'b' are large (B) 'a' is small and 'b' is large (C) 'a' is large and 'b' is small (D) Both 'a' and 'b' are small ●

8) The comparative rates at which the solutes move in paper chromatography depend on
(A) The size of paper (B) Temperature of the experiment (C) R_f values of solutes ● (D) Size of the chromatographic tank used

9) In the presence of KI, iodine dissolves in water due to formation of
(A) I_2 (B) I_3^- ● (C) I^- (D) I_2^-

10) When water freezes at 0°C, its density decreases due to
(A) Cubic structure of ice (B) Change of bond lengths (C) Change of bond angles (D) Empty spaces present in the structure of ice ●

11) The molecules of CO_2 in dry ice form the
(A) Ionic crystals (B) Covalent crystals (C) Molecular crystals ● (D) Atomic crystals

12) Splitting of spectral lines when atoms are subjected to strong magnetic field is called
(A) Zeeman effect ● (B) Stark effect (C) Photoelectric effect (D) Compton effect

13) The maximum number of electrons in a subshell is given by
(A) $2\ell - 1$ (B) $2\ell + 1$ (C) $2(2\ell - 1)$ (D) $2(2\ell + 1)$ ●

14) Which of the following molecules has net dipole moment?
(A) SiH_4 (B) SO_2 ● (C) $CC\ell_4$ (D) $A\ell C\ell_3$

15) Which of the following species has unpaired electrons in antibonding molecular orbitals?
(A) O_2^{2+} (B) O_2^{2-} (C) N_2^{2-} ● (D) F_2

16) For a given process, the heat change at constant pressure (q_p) and at constant volume (q_v) are related to each other as
(A) $q_p > q_v$ ● (B) $q_p < q_v$ (C) $q_p = q_v$ (D) $q_p = q_v/2$

17) 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

1124 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your Roll No.

Chemistry (Subjective) (Session 2020-22 to 2023-25) Group (II) Paper (I)

Time Allowed: 2.40 hours Section ---------- I Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Calculate the number of moles in 52 g of Aspartame ($C_{14}H_{18}N_2O_5$)
(ii) Write down the two steps to calculate the empirical formula.
(iii) Atomic masses of elements show many examples of fractional values. Justify.
(iv) How decolourization of undesirable colours can be done during crystallization.
(v) Define Sublimation. Name any two substances that can be sublimed.
(vi) What is safe and reliable method for drying the crystals? Briefly explain.
(vii) Calculate the mass of 10^{20} molecules of CO_2 at STP.
(viii) CO_2 is more non-ideal of 0°C than at 100°C. Explain with reason.
(ix) What is Joule-Thomson effect? Give its significance.
(x) Calculate the pH of 10^{-4} mole dm^{-3} of $Ba(OH)_2$
(xi) Write down K_c units for following reactions. $Sn^{+2}_{(aq)} + 2Fe^{+3}_{(aq)} \rightleftharpoons Sn^{+4}_{(aq)} + 2Fe^{+2}_{(aq)}$
(xii) The solubility of Glucose increases by increasing the temperature. Give reason.

3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Why melting and boiling points of halogens increase down the group.
(ii) Give one application of hydrogen bonding. **(iii)** Define isomorphism with one example.
(iv) Give two uses of Liquid Crystals. **(v)** Why positive rays are also called cannal rays.
(vi) What is Zeeman's effect. **(vii)** Give two postulates of Plank's theory.
(viii) State Hund's rule. **(ix)** Define energy of activation.
(x) Discuss homogeneous catalysis with example.
(xi) What is ebullioscopic constant. **(xii)** NaCℓ lowers the melting point of water. Justify.

4. Answer briefly any Six parts from the followings:- 6 × 2 = 12

(i) Why the second ionization energy is always greater than first ionization energy?
(ii) No bond in compounds is 100% ionic. Why? **(iii)** Sketch molecular orbital picture of N_2.
(iv) Define dipole moment. Give relationship between its various units.
(v) Define heat and temperature. **(vi)** What is thermochemical equation? Give two examples.
(vii) $\Delta H \approx \Delta E$ for reaction in solution form. Why?
(viii) Differentiate between oxidation and reduction with examples.
(ix) What electrode reactions occur in nickel cadmium battery?

Section ---------- II

Note: Attempt any three questions. (8 × 3 = 24)

5. **(a)** Define empirical formula. Write down any three steps involved in the determination of empirical formula.
(b) Define ionic solids. Write down its only three properties.

6. **(a)** A sample of krypton with a volume of 6.25 dm^3, a pressure of 765 torr and a temperature of 20 °C is expanded to a volume of 9.55 dm^3 and a pressure of 375 torr. What will be its final temperature in °C?
(b) Explain Millikan's oil drop experiment to determine the charge of an electron.

7. **(a)** Define hybridization. Explain sp^2 hybridization by taking example of Ethene.
(b) The solubility of PbF_2 at 25 °C is 0.64 g dm^{-3}. Calculate K_{sp} of PbF_2.

8. **(a)** Describe the measurement of enthalpy of a reaction by Bomb Calorimeter.
(b) Describe fuel cells. Give their uses.

9. **(a)** Describe Landsberger's method for the measurement of boiling point elevation.
(b) Write any four characteristics of a catalyst.

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1123 **Warning:- Please write your Roll No. in the space provided and sign** Roll No----------

(Inter Part – I) **(Session 2019-21 to 2022-24)** **Sig. of Student ----------**

Chemistry (Objective) **(Group - I)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2481** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper,** on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) The volume occupied by 1.4 g of N_2 at S.T.P. is
(A) 1.12 dm^3 (B) 2.24 dm^3 (C) 22.4 dm^3 (D) 112 cm^3

2) Which of the following is a monoisotopic element.
(A) Silver (B) Calcium (C) Chlorine (D) Fluorine

3) Which of the following can be sublime.
(A) Calcium (B) NaCl (C) Naphthalene (D) Na_2CO_3

4) Constant factor in charlie's law.
(A) Volume (B) Pressure (C) Tempreture (D) Both V and T

5) The order of rate of diffusion of gases NH_3, SO_2, Cl_2 and CO_2 is
(A) $NH_3>CO_2>SO_2>Cl_2$ (B) $NH_3>SO_2>Cl_2>CO_2$ (C) $Cl_2>SO_2>CO_2>NH_3$ (D) $NH_3>CO_2>Cl_2>SO_2$

6) Which of the following is amorphous solid
(A) NaCl (B) Glass (C) NaBr (D) CaF_2

7) Which of the following has highest vapour pressure at 25°C.
(A) Mercury (B) Ethanol (C) $CC\ell_4$ (D) Chloroform

8) When 6d orbital is complete the entering electron goes into
(A) 7f (B) 7s (C) 7d (D) 7p

9) Number of bonds in nitrogen molecule is
(A) One σ and one π (B) Three sigma (C) Two sigma and one π (D) One σ and Two π

10) Units of energy in which heat changes in S.I system are.
(A) Joule (B) Torr (C) Erg (D) Newton

11) The net heat change in a chemical reaction is same weather the reaction completes in one step or several steps. It is known as
(A) Henry's law (B) Joule's principle (C) Hesse's law (D) Law of conservation of energy

12) Mixture of NH_4OH and NH_4Cl makes a buffer whose pH is
(A) less than seven (B) 7 (C) More than seven (D) 4

13) For the reaction $N_2+3H_2 \rightleftharpoons 2NH_3$, The pressure at optimum condition is.
(A) 100 atm (B) 600 atm (C) 200-300 atm (D) 1000 atm

14) Molarity of pure water is.
(A) 01 (B) 55.5 (C) 18 (D) 8

15) If a strip of Cu metal is placed in a solution of $FeSO_4$
(A) Cu will be deposited (B) Fe is precipitated out (C) Cu and Fe both dissolved (D) No reaction takes place

16) Oxidation number of Mn in $KMnO_4$ is
(A) +5 (B) +7 (C) +3 (D) +2

17) The unit of rate constant is the same as that of the rate of reaction in
(A) First order reaction (B) Second order reaction (C) Zero order reaction (D) Third order reaction

1123 (Inter Part - I) **Warning:-** Please, do not write anything on this question paper except your **Roll No.**

Chemistry (Subjective) **(Session 2019-21 to 2022-24) Group (I) Paper (I)**

Time Allowed: 2.40 hours **Section ---------- I** **Maximum Marks: 68**

2. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) N_2 and CO have the same number of electrons, protons and neutrons.

(ii) 'Mg' atom is twice heavier than that of carbon atom.

(iii) How can the efficiency of a chemical reaction can be expressed?

(iv) List the four postulates of Kinetic molecular theory of gases.

(v) What are characteristics of plasma? **(vi)** Throw some Light on the factor $\frac{1}{273}$ in charle's Law.

(vii) The e/m value of positive rays for different gases are different but those for cathode rays the e/m values is the same. Justify it. **(viii)** What are the defects of Bohr's atomic model.

(ix) Compare line emission and line absorption spectra. **(x)** What is a spontaneous process? Give examples

(xi) Why is it necessary to mention the physical states of reactant and products in a thermochemical equation? **(xii)** Define state and state function's with one example for each.

3. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) What is parts per million. Write its formula?

(ii) What are the conditions should be fullfiled to observe colligative properties.

(iii) Define hydrates. Give example. **(iv)** What is activation of catalyst. Give one example?

(v) How surface area has effect on the rate of reaction? **(vi)** Catalyst are specific in their action.

(vii) Why sintered glass crucible is better than gouch crucible?

(viii) Write down major steps involved in complete quantitative analysis.

(ix) How mixture of sand and naphthalene can be separated?

(x) Earthenware vessel keep water cool. Justify. **(xi)** Define symmetry. What are symmetry elements.

(xii) Ionic solids are highly brittle in nature.

4. Answer briefly any Six parts from the followings:- **6 × 2 = 12**

(i) Define Bond Energy? **(ii)** A Salt Bridge maintains the electrical neutrality in the cell. Justify it.

(iii) Why cationic radius is smaller than atomic radius?

(iv) Why 2nd Ionization Energy is always greater than first Ionization Energy?

(v) What is pK_b? Give its significance. **(vi)** Define pH?

(vii) What does mean by chemical Equilibrium?

(viii) What is oxidation number? Give example. **(ix)** Define Electrolysis.

Section -------- II **Note: Attempt any three questions.** **(8 × 3 = 24)**

5. (a) Describe combustion analysis for the determination of percentage of C, H and O in an organic compound.

(b) Calculate the mass of 1 dm^3 of NH_3 gas at 30°C and 1000 mm Hg pressure, considering that NH_3 is behaving ideally.

6. (a) Describe Manometric method for determination of vapour pressure of a liquid with a diagram.

(b) What is Enthalpy of a reaction? How ΔH of a reaction is measured in Laboratory by glass calorimeter?

7. (a) Explain Heisenberg uncertainity principle.

(b) The solubility product of Ag_2CrO_4 is 2.6×10^{-2} at 25°C. Calculate the solubility of compound. Atomic mass of Ag=108 Cr=52 O=16.

8. (a) What is orbital hybridization? Explain the structure of CH_4 molecule on the basis of hybridization theory.

(b) Describe the construction and working of standard hydrogen electrode (SHE).

9. (a) Explain continuous and discontinuous solubility curves. **(b)** Describe energy of activation in detail.

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(Inter Part – I) **(Session 2019-21 to 2022-24)** **Sig. of Student ----------**

Chemistry (Objective) **(Group - II)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2488** **Maximum Marks:- 17**

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper,** on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) Which of the following has hydrogen bonding?
(A) CH_4 (B) $CC\ell_4$ (C) NH_3 (D) SiH_4

2) The electron affinity of chlorine is.
(A) -349 $kJ\ mol^{-1}$ (B) -249 $kJ\ mol^{-1}$ (C) -449 $kJ\ mol^{-1}$ (D) +396 $kJ\ mol^{-1}$

3) Acid having $K_a > 1$ will be .
(A) Weak (B) Very weak (C) Moderate (D) Strong

4) 18 g glucose is dissolved in 90 g of water. The relative lowering of vapour pressure is equal to
(A) $^1/_5$ (B) 5.1 (C) $^1/_{51}$ (D) 6

5) Orbitals having same energy are called:
(A) unhybrid orbitals (B) valence orbitals (C) degenerate orbitals (D) d-orbitals

6) The volume of 1.6g of CH_4 at S.T.P is
(A) 1.12 dm^3 (B) 2.24 dm^3 (C) 22.41 dm^3 (D) 112 dm^3

7) Partial pressure of oxygen in air at sea level is.
(A) 149 torr (B) 154 torr (C) 159 torr (D) 164 torr

8) In silver oxide battery, the cathode is made up of:
(A) AgO (B) Ag_2O (C) Ag_2O_3 (D) Ag

9) For the reaction $NaOH + HCl \rightarrow NaCl + H_2O$ the change in enthalpy is called:
(A) Heat of reaction (B) Heat of formation (C) Heat of neutralization (D) Heat of combustion

10) Stronger the oxidizing agent, greater is the:
(A) oxidation potential (B) reduction potential (C) redox potential (D) E.M.F of cell

11) The rate of reaction.
(A) increases as the reaction proceeds (B) decreases as the reaction proceeds (C) remains the same as the reaction proceeds (D) may decrease or increase as the reaction proceeds

12) 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

13) Solvent extraction method is a particularly useful technique for separation when the product to be separated is.
(A) non-volatile or thermally unstable (B) volatile or thermally stable (C) non-volatile or thermally stable (D) volatile or thermally unstable

14) The order of the rate of diffusion of gases NH_3, SO_2, Cl_2 and CO_2 is:
(A) $NH_3>SO_2>Cl_2>CO_2$ (B) $NH_3>CO_2>SO_2>Cl_2$ (C) $Cl_2>SO_2>CO_2>NH_3$ (D) $NH_3>CO_2>Cl_2>SO_2$

15) In order to raise the boiling point of water upto 110°C, the external pressure should be
(A) between 760 torr and 1200 torr (B) between 200 torr and 760 torr (C) 765 torr (D) any value of pressure

16) Which of the following molecules has zero dipole moment?
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

17) 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

1123 (Inter Part - I) **Warning:- Please, do not write anything on this question paper except your Roll No.**

Chemistry (Subjective) (Session 2019-21 to 2022-24) Group (II) Paper (I)

Time Allowed: 2.40 hours Section ---------- I Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Define gram atomic mass and gram molecular mass. (ii) Define molecular ion. Give one example.
(iii) Mg atom is twice heavier than that of carbon atom. Give reason.
(iv) State Graham's Law of diffusion. Write its mathematical form.
(v) How the process of respiration obeys the Dalton's law of partial pressure.
(vi) Give verification of Boyle's law from kinetic molecular theory of gases.
(vii) Why e/m value of cathode rays is just-equal to that of electron.
(viii) State Moseley's law. Give its Mathematical expression.
(ix) What is orbital? Draw the shape of p-orbital. (x) Define Enthalpy of Atomization. Give one example.
(xi) What are spontaneous and non-spontaneous processes. Give one example for each.
(xii) State Hess's law of constant heat summation. Write its mathematical form.

3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Define sublimation giving two examples.
(ii) Give sailent features of a solvent used in process of crystalization.
(iii) Describe most safe and reliable method for drying of crystals.
(iv) Why melting point and boiling point of halogens increases down the group.
(v) Lower alcohols are soluble in water while hydrocarbons are insoluble. Give reason.
(vi) Cleavage of crystals is anistropic property. Explain.
(vii) Why aquous solution of NH_4Cl is acidic in nature.
(viii) Define solubility with two examples. (ix) Why NaCl and KNO_3 are used to lower melting point of ice.
(x) Define the term energy of activation. (xi) A catalyst is specific in its action. Justify it.
(xii) Rate of reaction decreases with passage of time. Justify it.

4. Answer briefly any Six parts from the followings:- 6 × 2 = 12

(i) Define electronegativity. How does it vary in the group of periodic table?
(ii) Pi (π) bonds are more diffused than sigma bonds. Give the reason.
(iii) Define coordinate covalent bond. Give an example.
(iv) How can we prepare basic buffers? Give an example.
(v) Calculate the pH of 10^{-4} mole dm^{-3} of $Ba(OH)_2$. (vi) Give two applications of common ion effect.
(vii) What is standard hydrogen electrode (SHE)?
(viii) Give the electrode reactions during the recharging of lead accumulator.
(ix) Calculate the oxidation number of Cr in $Cr_2(SO_4)_3$ and $Cr_2O_7^{2-}$

Section ---------- II Note: Attempt any three questions. (8 × 3 = 24)

5. (a) Explain evidence of atoms with the help of diagram.
(b) 250 cm^3 of hydrogen is cooled from 127°C to -27°C by maintaining the pressure constant. Calculate the new volume of the gas at Low temperature.

6. (a) Explain molecular solids in detail.
(b) State and explain Hess's law of constant Heat summation with two examples.

7. (a) Write down any four properties of cathode rays.
(b) What is the percentage ionization of acetic acid in a solution in which 0.1 Mole of it has been dissolved per dm^3 of the solution.

8. (a) Explain paramagnetic nature of oxygen on the basis of MOT.
(b) Describe the construction and working of standard hydrogen electrode (SHE).

9. (a) Explain phenol-water system in detail.
(b) Write down any four characteristics of catalyst.

1121 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your Roll No.

Chemistry (Subjective) (Session 2017-19 to 2020-22) **Group (I)** **Paper (I)**

Time Allowed: 2.40 hours **Section ---------- I** Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Justify the statement 23g sodium and 238g of uranium have equal no of atoms.

(ii) Magnesium atom is twice heavier than that of carbon atom.

(iii) 180 g glucose and 342g of sucrose have same number of molecules but different number of atoms present in them.

(iv) What is difference between partition and adsorption type of chromatography.

(v) Define sublimation by giving one example.

(vi) Sate charless law by giving its mathematical expression.

(vii) Do you think that some of the postulates in kinetic molecular theory of gases are faulty? Point out these postulates. (viii) State Avogadro's law of gases?

(ix) Where is plasma found?

(x) Define fractional crystallization by giving one example.

(xi) Why $Na_2SO_4 .10H_2O$ shows discontinuous solubility curve.

(xii) Define colligative properties.

3. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Define dipole-dipole forces with one example.

(ii) What is dipole-induced dipole force? (iii) Define London dispersion forces.

(iv) Why methane is gas while hexane is a liquid

(v) Define spectrum. (vi) What is Stefan's law (vii) Define Heisenberg's uncertainity principle.

(viii) Define atomic orbital. (ix) Define the Le-Chatelier's principle.

(x) Why catalyst does not affect the equilibrium position.

(xi) Define order of reaction. (xii) What is half life period

4. Answer briefly any Six parts from the followings:- **6 × 2 = 12**

(i) Define ionization energy and electron affinity with one example in each case.

(ii) Write the Lewis Structures for the following compounds.

(a) HCN (b) $CC\ell_4$

(iii) Define hybridization. What type of hybridization is found in CH_4?

(iv) Write down four postulates of VSEPR Theory.

(v) Define the following with one example in each case

(a) Standard enthalpy of reaction. (b) Standard enthalpy of combustion.

(vi) Differentiate between internal energy of the system and the enthalpy of the system.

(vii) Why the standard oxidation potential of Zn is+0.76 V and its reduction potential is -0.76 V?

(viii) Why the equilibrium is set up between metal atoms of electrode and ions of metal in a cell?

(ix) Why a salt bridge maintains the electrical neutrality in the cell?

Section ---------- II

Note: Attempt any three questions. **(8 × 3 = 24)**

5. (a) Calculate the masses of 10^{-3} moles of $MgSO_4$ and 2.74 moles $KMnO_4$.

(b) Describe any four crystal systems.

6. (a) Write down eight postulates of Kinetic molecular theory of gases.

(b) Derive the equation for the radius of n^{th} orbit of hydrogen atom using Bohr's model.

7. (a) Define ionization energy. Name the factors on which it depends. Also explain its trends in the periodic table.

(b) Define enthalpy and prove that $\Delta H = q_p$.

8. (a) What is the percentage ionization of acetic acid in a solution in which 0.1 mol of it has been dissolved per dm^3 of the solution (K_a=1.85 × 10^{-5})

(b) What is Arrhenius Equation? How can you calculate the energy of activation of a reaction from this equation.

9. (a) Briefly explain the working of Galvanic Cell.

(b) Explain Beckmann method to determine depression of Freezing Point.

1121 Warning:- Please write your Roll No. in the space provided and sign. Roll No----------

(Inter Part – I) (Session 2017-19 to 2020-22) Sig. of Student ----------

Chemistry (Objective) **(Group - I)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2481** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper,** on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) Isotopes differ in the presence of
(A) Electrons (B) Protons (C) Neutrons (D) Positrons

2) Average atomic mass of Neon is
(A) 20.81 (B) 21.81 (C) 22.18 (D) 20.18

3) The rate at which solutes move in paper chromatography depend on
(A) Size of paper (B) R_f values of solutes (C) Temperature (D) Pressure

4) Kinetic energy of gas molecules is zero at
(A) $0C°$ (B) $0F°$ (C) 0k (D) $-10C°$

5) The number of molecules of water in one dm^3 is close to
(A) $\frac{6.02}{22.4}\times 10^{23}$ (B) 18×10^{23} (C) $\frac{12.04}{22.4}\times 10^{23}$ (D) $55.6\times6.02\times10^{23}$

6) The number of unit cell parameters are
(A) 2 (B) 4 (C) 6 (D) 8

7) The maximum boiling point of NH_3 among the hydrides of group V is due to
(A) Small size of N atom (B) Lone pair of electron (C) Enhanced electro negative character of Nitrogen (D) Pyramidal shape of NH_3

8) Splitting of spectral lines in a strong Electric field is called
(A) Zeeman effect (B) Stark effect (C) Compton effect (D) Photoelectric effect

9) Bohr Model of atom is contradicted by
(A) Plank's quantum Theory (B) Dual nature (C) Heisen berg's principle (D) Pauli's exclusion principle

10) The number of bonds in oxygen molecule is
(A) Two σ bonds (B) Two π bonds (C) one σ , one π (D) one σ , Two π

11) Bond order of Helium molecule is
(A) Zero (B) One (C) Two (D) Three

12) Which of these is not a state function.
(A) Temperature (B) Pressure (C) Volume (D) Heat

13) How much nitrogen fixation is carried out by Haber's process.
(A) 13% (B) 35% (C) 50% (D) 73%

14) The value of pK_w at 25 °C for water is
(A) 10^{-7} (B) 7 (C) 10^{-14} (D) 14

15) 18g Glucose is dissolved in 90g of water the relative lowering of vapour pressure is
(A) $\frac{1}{5}$ (B) 5.1 (C) $\frac{1}{51}$ (D) 6

16) Stronger the oxidizing agent, greater is the
(A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F. of cell

17) In Zero order reaction the rate is independent of
(A) Temperature (B) Pressure (C) Concentration (D) Volume

1121 Warning:- Please write your Roll No. in the space provided and sign. Roll No----------
(Inter Part – I) (Session 2017-19 to 2020-22) Sig. of Student ----------

Chemistry (Objective) **(Group - II)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2488** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper**, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) If the salt bridge is not used between two half cells, then the voltage
(A) Decrease rapidly (B) Decrease slowly (C) Does not change (D) Drops to zero

2) If the rate equation of a reaction $2A + B \longrightarrow$ products is, rate = $k[A]^2[B]$ and A is present in large excess, then order of reaction is
(A) 1 (B) 2 (C) 3 (D) 1.5

3) The angle between sides 'b' and 'c' is _____
(A) Beta (B) Alpha (C) Theta (D) Gamma

4) Isotopes differ in
(A) Properties which depend upon mass (B) Arrangement of electrons in orbitals (C) Chemical properties (D) The extent to which they may be affected in electromagnetic field

5) The number of atoms in 1.79 g of gold and _____ g of sodium are equal.
(A) 0.023 (B) 23 (C) 230 (D) 2300

6) The comparative rates at which the solutes move in paper chromatography depend on
(A) R_f values of solutes (B) The size of paper (C) Temperature of the experiment (D) Size of the chromatographic tank used

7) Equal masses of methane and oxygen are mixed in an empty container at 25 °C. The fraction of total pressure exerted by methane is
(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{9}$ (D) $\frac{8}{9}$

8) The molar volume of CO_2 is maximum at
(A) 127 °C and 1 atm (B) 0 °C and 2 atm (C) S.T.P (D) 273 °C and 2 atm

9) Intermolecular forces present in ammonia are _____.
(A) Hydrogen bonding (B) Ion-dipole forces (C) Dipole-induced dipole forces (D) London-dispersion forces

10) Quantam number values for '3d' orbitals will be
(A) n=3 , ℓ=0 (B) n=3 , ℓ =1 (C) n=3 , ℓ =2 (D) n=3 , ℓ =3

11) Orbitals having same energy are called
(A) Valence orbitals (B) Hybrid orbitals (C) d-orbitals (D) Degenerate orbitals

12) Bond order of helium molecule is _____.
(A) Two (B) One (C) Zero (D) Three

13) Berylliumdichloride follows _____ hybridization
(A) sp (B) sp^3 (C) sp^2 (D) sp^3d^2

14) The Born-Haber cycle is the application of _____ law.
(A) Hess's (B) Le-chatlier (C) Coulomb (D) Pascal

15) The pH of 0.001 $moldm^{-3}$ of an aqueous solution of H_2SO_4 is
(A) 3 (B) 2.7 (C) 2.0 (D) 1.5

16) The pH of human blood is maintained at _____
(A) 7 (B) 7.35 (C) 7.95 (D) 8.00

17) The molal boiling point constant is the ratio of the elevation in boiling point to
(A) Molarity (B) Molality (C) Mole fraction of solvent (D) Mole fraction of solute

1121 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your Roll No.
Chemistry (Subjective) (Session 2017-19 to 2020-22) **Group (II)** **Paper (I)**
Time Allowed: 2.40 hours **Section ---------- I** Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Justify that 180 g of glucose and 342 g of sucrose have the same number of molecules but different number of atoms present in them. (ii) Define isotopes. Give one example.
(iii) What is gram atom? How we can calculate gram atom of an element? Give its relationship.
(iv) What is chromatography? Write its two uses. (v) Define sublimation. Write two solids which can be sublimed.
(vi) Differentiate between natural and artificial Plasma.
(vii) Derive the units for gas constant R in general gas equation when the pressure is in atmosphere and volume in dm^3.
(viii) Verify Boyle's law from kinetic theory of gases.
(ix) Write two applications of Dalton's law of partial pressure.
(x) Define solubility. How it can be expressed? (xi) What is discontineous solubility curve. Give one example.
(xii) How do you Justify that freezing points are depressed due to the presence of solutes.

3. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Why in a very cold winter the fish in gardens ponds owe their lives to hydrogen bonding?
(ii) Why water and ethanol can mix easily and in all proportions.
(iii) Define unit cell. Give one example. (iv) Define transition temperature. Give one example.
(v) What is hydrogen spectrum. Name four spectral lines.
(vi) Write down two defects in Bohr's atomic model.
(vii) Whichever gas is used in discharge tube, the nature of the cathode rays remains the same. Why?
(viii) Give any two properties of cathode rays. (ix) Define (a) Reversible reactions (b) state of equilibrium.
(x) Define Buffer capacity. (xi) Define instantaneous and average rates of reaction
(xii) Define specific rate constant or velocity constant.

4. Answer briefly any Six parts from the followings:- **6 × 2 = 12**

(i) Differentiate between polar and non polar covalent bond.
(ii) Explain the formation of co-ordinate covalent bond between NH_3 & BF_3
(iii) Explain the geometry of H_2S molecule on the basis of VSEPR theory.
(iv) How ionization energy varies in the periodic table.
(v) Define standard enthalpy of formation with two examples.
(vi) Differentiate between atomization energy and Lattice energy.
(vii) How electrochemical series helps to predict the feasibility of a chemical reaction? Give an example.
(viii) Write the function of salt bridge in Galvanic cell.
(ix) Differentiate between Galvanic cell and electrolytic cell.

Section ---------- II

Note: Attempt any three questions. **(8 × 3 = 24)**

5. (a) Calculate the number of grams of K_2SO_4 and water produced when 14 gram of KOH are reacted with excess of H_2SO_4. Also calculate the number of molecules of water produced.
(b) How does hydrogen bonding explains the following
(i) Structure of DNA (ii) Structure of Ice.

6. (a) Write down the postulates of Kinetic molecular theory of gases.
(b) Explain Millikan's oil drop experiment to determine the charge of an electron.

7. (a) Draw and discuss the geometry of Ethylene with respect to sp^2-hybridization.
(b) How can you measure enthalpy of reaction by glass calorimetric method.

8. (a) The following reaction was allowed to reach the state of equilibrium $2A_{(aq)} + B_{(aq)} \rightleftharpoons C_{(aq)}$ the initial amount of the reactants present in one dm^3 of solution were 0.50 moles of A and 0.60 moles of B. At equilibrium the amounts were 0.20 moles of A and 0.45 moles of B and 0.15 moles of C. Calculate the equilibrium constant K_c.
(b) Define half life period. Explain with two examples.

9. (a) Give differences between Ideal and Non-Ideal solution.
(b) Write different rules for assigning oxidation number by giving one example.

1119 Warning:- Please write your Roll No. in the space provided and sign. Roll No----------
(Inter Part – I) (Session 2015-17 to 2018-20) Sig. of Student ----------
Chemistry (Objective) (Group - I) Paper (I)
Time Allowed:- 20 minutes **PAPER CODE 2487** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper,** on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) Molarity of pure water is
(A) 1 (B) 18 (C) 55.5 (D) 6

2) Which of the following statement is correct about galvanic cell.
(A) Anode is negatively charged (B) Reduction occurs at anode (C) Cathode is positively charged (D) Reduction occurs at cathode

3) With increase of 10 $^{\circ}C$ temperature the rate of reaction doubles. This increase in rate of reaction is due to
(A) Decrease in activation energy of reaction (B) Decrease in the number of collisions between reactant molecules (C) Increase in activation energy (D) Increase in number of effective collisions

4) The mass of one mole of electron is
(A) 1.008 mg (B) 0.55 mg (C) 0.184 mg (D) 1.673 mg

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) Solvent extraction method is a particularly useful technique for separation when the product to be separated is
(A) Non-volatile or thermally unstable (B) Volatile or thermally stable (C) Non-volatile or thermally stable (D) Volatile or themally unstable

7) Equal masses of methane and oxygen are mixed in an empty container at 25 $^{\circ}C$. The fraction of total pressure exerted by oxygen is
(A) $\frac{1}{3}$ (B) $\frac{8}{9}$ (C) $\frac{1}{9}$ (D) $\frac{16}{17}$

8) Pressure remaining constant, at which temperature, the volume of a gas will become twice of what is at 0 $^{\circ}C$
(A) 546 $^{\circ}C$ (B) 200 $^{\circ}C$ (C) 546 K (D) 273 K

9) When water freezes at 0 $^{\circ}C$, its density decreases due to
(A) Cubic structure of ice (B) Empty spaces present in the structure of ice (C) Change of bond lengths (D) Change of bond angles

10) The molecules of CO_2 in dry ice form the
(A) Ionic crystals (B) Covalent crystals (C) Molecular crystals (D) Any type of crystals

11) The wave number of the light emitted by a certain source is $2\times10^{6}\,m^{-1}$. The wavelength of this light will be
(A) 500 nm (B) 500 m (C) 200 nm (D) $5\times10^{7}\,m$

12) Orbitals having same energy are called,
(A) Hybrid orbitals (B) Valence orbitals (C) Degenerate orbitals (D) d-orbitals

13) Which of the following molecules has zero dipole moment.
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

14) Which of the hydrogen halides has the highest percentage of ionic character.
(A) HCl (B) HBr (C) HF (D) HI

15) The net heat change in a chemical reaction is same, whether it is brought about in two or more different ways in one or several steps. It is known as
(A) Henry's Law (B) Joule's principle (C) Hess's Law (D) Law of Conservation of energy

16) 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

17) An azeotropic mixture of two liquids boils at a lower temperature than either of them when
(A) It is saturated (B) It shows positive deviation from Rault's Law (C) It shows negative deviation from Rault's Law (D) It is metastable

1119 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your Roll No.
Chemistry (Subjective) (Session 2015-17 to 2018-20) **Group (I)** **Paper (I)**
Time Allowed: 2.40 hours **Section ---------- I** Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Differentiate between atom and molecule
(ii) Write function of $Mg(ClO_4)_2$ and 50% KOH in combustion analysis.
(iii) Differentiate between empirical and molecular formula.
(iv) What is R_f value. Why does it has no units. (v) How is a saturated solution prepared.
(vi) Define absolute zero temperature. (vii) Water vapours do not behave ideally at 273K. Justify.
(viii) Define one atmospheric pressure. Give its two units. (ix) Prove that $d = \frac{PM}{RT}$
(x) Define mole fraction and Parts per million.
(xi) Define critical solution temperature and conjugate solutions.
(xii) Write names of colligative properties of dilute solutions.

3. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Why ice occupies 9% more volume than liquid water?
(ii) How Soaps and detergents do their cleansing action?
(iii) How vacuum distillation can be used to avoid decomposition of a sensitive liquid?
(iv) Define Molar Heat of vapourization. (v) Why e/m value of cathode rays is just equal to that of electron?
(vi) Give electronic configuration of $_{24}Cr$ and $_{20}Ca$ (vii) Write two properties of positive rays.
(viii) Why it is necessary to decrease the pressure in the discharge tube to get the cathode rays?
(ix) State Lowery-Bronsted acid and base theory. (x) Define the term activation of catalyst.
(xi) How does buffer act? (xii) Differentiate between Homogenous and Heterogenous catalysis.

4. Answer briefly any Six parts from the followings:- **6 × 2 = 12**

(i) Define coordinate covalent bond. Give one example.
(ii) How does molecular orbital theory explain paramagnetic properties of oxygen?
(iii) Ionic compounds are mostly soluble in water but insoluble in non-polar solvents. Give reason.
(iv) The difference in electronegativity of bonded atoms is an index of polar nature of the covalent bond. Comment on the statement.
(v) Define spontaneous process giving one example.
(vi) Justify that heat of formation of compound is the sum of all the other enthalpies.
(vii) How does electrochemical series explain the displacement of one metal by another from its solution?
(viii) Write down reactions involved in the working of NICAD cell.
(ix) Write down the construction of standard hydrogen electrode (SHE)

Section ---------- II

Note: Attempt any three questions. **(8 × 3 = 24)**

5. (a) Define yield of chemical reaction. Also define two types of yields. How these two yields are related by a mathematical expression?
   (b) Describe covalent solids with reference to
   (i) hardness, (ii) conductivity, (iii) solubility in water, and (iv) melting points.
6. (a) 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 $10\,dm^3$ flask and cooled to $27\,°C$. Calculate the pressure in Nm^{-2} exerted by gas at 27 C^o.
   (b) Define spectrum. Give difference between Continuous and Line spectrum.
7. (a) Write main postulates of VSEPR-theory.
   (b) How heat of combustion is measured by Bomb calorimeter?
8. (a) Calculate the pH of a buffer solution in which 0.11 molar CH_3COONa and 0.09 molar acetic acid solutions are present. K_a for CH_3COOH is 1.85×10^{-5}
   (b) Describe Half life method for finding order of reaction.
9. (a) Explain the effect of temperature on Phenol-Water System.
   (b) Describe the electrolysis of molten sodium chloride

Warning:- Please write your Roll No. in the space provided and sign. Roll No----------

(Inter Part – I) (Session 2015-17 to 2018-20) Sig. of Student ----------

Chemistry (Objective) (Group - II) Paper (I)

Time Allowed:- 20 minutes **PAPER CODE 2482** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation.** Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) One mole of SO_2 contains;
(A) 6.02×10^{23} atoms of oxygen (B) 18.1×10^{23} molecules of SO_2 (C) 6.02×10^{23} atoms of sulphur (D) 4 gram atoms of SO_2

2) The mass of one mole of electrons are
(A) 1.008 mg (B) 0.55 mg (C) 0.184 mg (D) 1.673 mg

3) The comparative rates at which the solutes move in paper chromatography depend on
(A) The size of paper (B) R_f values of solutes (C) Temperature of the experiment (D) Size of the chromatographic tank

4) Pressure remaining constant, at which temperature the volume of a gas will becomes twice of what it is at $0\,^{\circ}C$.
(A) 546 $^{\circ}C$ (B) 200 $^{\circ}C$ (C) 546 K (D) 273 K

5) Number of molecules in one dm^3 of water is close to
(A) $\frac{6.02}{22.4}\times10^{23}$ (B) $\frac{12.04}{22.4}\times10^{23}$ (C) $\frac{18}{22.4}\times10^{23}$ (D) $55.6\times6.02\times10^{23}$

6) When water freezes at $0\,^{\circ}C$, its density decreases due to
(A) Cubic structure of ice (B) Empty spaces present in the structure of ice (C) Change in bond lengths (D) Change of bond angles

7) Diamond is a bad conductor because
(A) It has a tight structure (B) It has a high density (C) There are no free electron present in the crystal of [illegible] to conduct ele[illegible] (D) [illegible]nsparent to

8) Orbitals having same energy are called;
(A) Hybrid orbitals (B) Valence orbitals (C) Degenerate orbitals (D) d-orbitals

9) When 6d orbital is complete, the entering electrons goes into;
(A) 7f (B) 7s (C) 7p (D) 7d

10) In the following species which have unpaired electrons in antibonding molecular orbitals.
(A) O_2^{2+} (B) N_2^{2-} (C) B_2 (D) F_2

11) In the following molecules which have zero dipole moment.
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

12) For the reaction $NaOH + HCl \longrightarrow NaCl + H_2O$ the change in enthalpy is called;
(A) Heat of reaction (B) Heat of formation (C) Heat of Neutralization (D) Heat of combustion

13) The solubility product of AgCl is $2.0\times10^{-10}\,mol^2dm^{-6}$. The maximum concentration of Ag^+ ions in the solution is
(A) $2.0\times10^{-10}\,mol\,dm^{-3}$ (B) $1.41\times10^{-5}\,mol\,dm^{-3}$ (C) $1.0\times10^{-10}\,mol\,dm^{-3}$ (D) $4.0\times10^{-20}\,mol\,dm^{-3}$

14) 18 g of glucose is dissolved in 90 g of water. The relative lowering of vapour pressure is equal to
(A) $\frac{1}{5}$ (B) 5.1 (C) $\frac{1}{51}$ (D) 6

15) An aqueous solution of ethanol in water may have vapour pressure;
(A) Equal to that of water (B) Equal to that of ethanol (C) More than that of water (D) Less than that of water

16) If a strip of Cu metal is placed in a solution of $FeSO_4$
(A) Cu will be deposited (B) Fe is precipitated out (C) Cu and Fe both dissolve (D) No reaction take place

17) The unit of the rate constant is the same as that of the rate of reaction in
(A) First order reaction (B) Second order reaction (C) Zero order reaction (D) Third order reaction

1119 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your ...
Chemistry (Subjective) (Session 2015-17 to 2018-20) Group (II) Paper (I)
Time Allowed: 2.40 hours Section ---------- I Maximum Marks: 68

2. **Answer briefly any Eight parts from the followings:-** $8 \times 2 = 16$

(i) Define macromolecules give examples. (ii) Differentiate between cation and Anion.
(iii) Atomic mass of elements are in fraction give reason.
(iv) Write four properties of best solvent. (v) Why is there need to crystallize crude products.
(vi) State charles law, write its mathematical form. (vii) Write any four properties of liquid.
(viii) Derive the value of "R" in "SI" units. (ix) Define Avogadros Law give examples.
(x) Define Molality. Also write its formula.
(xi) Write two difference between Ideal and Non Ideal solutions.
(xii) Aqeous solution of CH_3COONa is basic and aqeous solution of $CuSO_4$ is acidic give reason.

3. **Answer briefly any Eight parts from the followings:-** $8 \times 2 = 16$

(i) Write down any two uses of liquid crystals in daily life.
(ii) One feels sense of cooling under the fan after bath. Comment on it.
(iii) Ionic crystals donot conduct electricity in the solid state. Justify it.
(iv) Why sodium chloride and caesium chloride have different structures.
(v) State Moseley Law, Also write its two importance in periodic table.
(vi) Write down two defects of Rutherford's Atomic model.
(vii) Describe any two properties of canal rays.
(viii) How ${}^{14}_{7}N$ is converted into ${}^{11}_{5}B$. Give equation. (ix) State Le-chatelier's principle.
(x) Define pH and pOH. (xi) Describe Heterogeneous catalysis with an example.
(xii) Write note on (a) Auto catalyst (b) Promotor

4. **Answer briefly any Six parts from the followings:-** $6 \times 2 = 12$

(i) Define ionization energy. Give an example.
(ii) Why does the lone pair occupy more space than bond pair.
(iii) MOT is superior to VBT. Explain. (iv) Why dipolemoment of CO_2 is zero but H_2O 1.85 Debye.
(v) Define heat of neutralisation. Give an example. (vi) State Hess's Law.
(vii) Differentiate between electrolytic and Galvanic cell.
(viii) How is the impure copper purified. (ix) Explain the electrolysis of fused $PbCl_2$

Note: Attempt any three questions. **Section ---------- II** $(8 \times 3 = 24)$

5. (a) Define empiral formula. Write down various steps to calculate the empirical formula of a compound.
   (b) Differentiate between isomorphism and polymorphism with suitable examples.

6. (a) One mole of methane gas is maintained at 300 K. Its volume is 250 cm^3. Calculate the pressure exerted by the gas when gas is behaving as ideal.
   (b) Describe J.J. Thomson experiment to determine the e/m value of an electron.

7. (a) Explain para magnetic behaviour of O_2 on the basis of Molecular orbital theory.
   (b) Describe bomb Calorimeter method for calculation of enthalpy of a substance.

8. (a) The solubility of PbF_2 at 25°C is 0.64 $g\,dm^{-3}$. Calculate solubility product constant (K_{sp}) of PbF_2 Molar mass of $PbF_2 = 245.2\ g\,mol^{-1}$
   (b) Define order of a chemical reaction. How does half-life method can be used for its measurement.

9. (a) Give graphical explanation for depression in freezing point.
   (b) Define electrochemical series of elements. Give its two applications.

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(Inter Part – I) (Session 2015-17 to 2017-19) Sig. of Student ----------

Chemistry (Objective) **(Group - I)** **Paper (I)**

Time Allowed:- 20 minutes **PAPER CODE 2483** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper,** on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) The order of reaction for the reaction $NO + O_3 \longrightarrow NO_2 + O_2$ is
(A) Two (B) Three (C) One (D) Zero

2) The number of isotopes of Cd is
(A) 6 (B) 2 (C) 9 (D) 11

3) Ascorbic Acid is
(A) Vitamin A (B) Vitamin B (C) Vitamin C (D) Vitamin D

4) The comparative rates at which the solutes move in paper chromatography depends on
(A) Size of paper (B) R_f value of solute (C) Temperature of experiment (D) None of these

5) The order of rate of diffusion of gases NH_3, SO_2, Cl_2 *and* CO_2 is.
(A) $NH_3 > SO_2 > Cl_2 > CO_2$ (B) $NH_3 > CO_2 > SO_2 > Cl_2$ (C) $Cl_2 > SO_2 > CO_2 > NH_3$ (D) $NH_3 > CO_2 > Cl_2 > SO_2$

6) Cholesteryl benzoate turn into milky liquid at
(A) 140 °C (B) 145 °C (C) 148 °C (D) 149 °C

7) Acetone and chloroform are soluble in each other due to
(A) Ion dipole interaction (B) Intermolecular hydrogen bonding (C) Instantaneous dipole (D) All of the above

8) The ion that is isoelectronic with CO is.
(A) $C\bar{N}$ (B) O_2^+ (C) O_2^- (D) N_2^+

9) The velocity of photon is
(A) Independent of its wavelength (B) Depend on its source (C) Nature of discharge tube (D) Equal to square of its amplitude

10) Which of the Hydrogen halides has the highest percentage of ionic character?
(A) HCl (B) HBr (C) HF (D) HI

11) The bond order of N_2 molecule is
(A) Zero (B) I (C) 2 (D) 3

12) Enthalpies of all elements in their standard states are
(A) Unity (B) Zero (C) Always Positive (D) Always negative

13) The total heat content of system is called
(A) Entropy (B) Enthalpy (C) Temperature (D) Internal energy

14) The exothermic process is
(A) Evaporation (B) Sublimation (C) Combustion of methane (D) Boiling

15) Which one of the following is an ideal solution.
(A) $C_2H_5 - OH$ and H_2O (B) C_6H_6 and CCl_4 (C) $CHCl_3$ and $(CH_3)_2CO$ (D) None of these

16) Which salt when dissolved in water form a solution with pH greater than 7
(A) $CuSO_4$ (B) NaCl (C) NH_4Cl (D) Na_2CO_3

17) Standard Hydrogen Electrode (SHE) is made of
(A) Ag foil (B) Au foil (C) Cu foil (D) Pt foil

1118 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your Roll No.

Chemistry (Subjective) (Session 2015-17 to 2017-19) **Paper (I)**

Time Allowed: 2.40 hours **Group (I)** Maximum Marks: 68

Section ---------- I

2. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) Write only names of any four methods employed for the separation of Isotopes.

(ii) Define gram atom giving an example. (iii) Why is theoretical yield greater than actual yield?

(iv) Differentiate between stationary and mobile phase. (v) Write uses of Chromatography.

(vi) Justify that the volume of given mass of a gas becomes theoretically zero at $-273\ ^{\circ}C$.

(vii) Hydrogen and Helium are ideal at room temperature, but SO_2 and Cl_2 are non ideal explain it.

(viii) Write two applications of Plasma. (ix) Define common Ion effect with one example.

(x) Define solubility product giving at least one example.

(xi) Define Law of Mass action. (xii) Define Lowry Bronsted acid and base concept.

3. Answer briefly any Eight parts from the followings:- **8 × 2 = 16**

(i) What are Hydrates? Give an example. (ii) Define ppm and Mole fraction.

(iii) How electron affinity changes in a group? (iv) Why sigma bond is stronger than π bond?

(v) What is meant by dipole moment and what are its units?

(vi) How a co-ordinate covalent bond differs from a covalent bond?

(vii) What is meant by internal energy of a System? (viii) Define System and Surrounding.

(ix) $HC\ell$ is stronger acid than HF. Why? (x) Iodine dissolves readily in CCl_4. Why?

(xi) Define Polymorphism and Allotropy.

(xii) Why vapour pressure of CCl_4 is 87 torr while isopentane is 580 torr at $20\ ^{\circ}C$?

4. Answer briefly any Six parts from the followings:- **6 × 2 = 12**

(i) Describe Zeeman's and Stark's effect:

(ii) Calculate the mass of an electron, $\frac{e}{m} = 1.7588 \times 10^{11}\ coulombs/kg$

(iii) The $\frac{e}{m}$ values of positive rays obtained from hydrogen gas is 1836 Time less than that of Cathode rays. Justify.

(iv) Differentiate between frequency and wave number.

(v) 'Zn' can displace Hydrogen from dilute acid solution but 'Cu' cannot. Justify.

(vi) Calculate oxidation number of 'Cr' in (a) $CrCl_3$ (b) $K_2Cr_2O_7$

(vii) What is difference between Primary and Secondary Cell.

(viii) What is Zero order reaction? Give one example.

(ix) What is specific rate Constant or Velocity Constant.

Section ---------- II

Note: Attempt any three questions. **(8 × 3 = 24)**

5. **(a)** Ethylene glycol is used as automobile antifreez. It has 38.7 % carbon, 9.7 % hydrogen and 51.6 % oxygen. Determine its empirical formula.

(b) Explain the term molecular solid. Give three properties of molecular solids.

6. **(a)** Give explaination of applications of Dalton's Law of Partial Pressure of gases.

(b) Derive an expression for radius of nth orbit of Hydrogen atom with the help of Bohr's atomic model.

7. **(a)** Write down main points of Valence Shell electron pair repulsion (VSEPR) theory.

(b) Describe Bomb Calorimeter, for calculation of enthalpy of a substance.

8. **(a)** State Law of mass action. Derive an equilibrium constant expression for a general reaction.

(b) Write a note on Fuel cells.

9. **(a)** What is Catalyst? Write its three characteristics?

(b) The freezing point of pure Camphor is $178.4\ ^{\circ}C$. Find the freezing point of a solution containing 2.0 g of non-volatile compound, having molecular mass 140, in 40 g of Camphor. The molal freezing point constant of Camphor is $37.7\ ^{\circ}C\ kg\ mol^{-1}$

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(Inter Part – I) (Session 2015-17 to 2017-19) Sig. of Student ----------

Chemistry (Objective) (Group - II) Paper (I)

Time Allowed:- 20 minutes **PAPER CODE 2482** Maximum Marks:- 17

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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE, which is printed on this question paper,** on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) 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

2) The volume occupied by 1.4 g of N_2 at S.T.P is
(A) 2.24 dm^3 (B) 22.4 dm^3 (C) 1.12 dm^3 (D) 112 cm^3

3) Solvent extraction is an equilibrium process and is controlled by
(A) Law of mass action (B) Amount of solvent used (C) Distribution Law (D) The amount of solute

4) Equal masses of methane and oxygen are mixed in an empty container at 25 °C. The fraction of total pressure exerted by oxygen is
A) $\frac{1}{3}$ (B) $\frac{8}{9}$ (C) $\frac{1}{9}$ (D) $\frac{16}{17}$

5) The molar volume of CO_2 is maximum at
(A) STP (B) 127 °C and 1 atm (C) 0 °C and 2 atm (D) 273 °C and 2 atm

6) Acetone and chloroform are soluble in each other due to
(A) Intermolecular hydrogen bonding (B) Ion-dipole interaction (C) Instantaneous dipole (D) All of the above

7) Molecules of CO_2 in dry ice form the
(A) Ionic crystals (B) Covalent crystals (C) Molecular crystals (D) Any type crystal

8) The wave ------- number of the light emitted by a certain source is 2×10^6 m^{-1}. The wave-length of this light will be
(A) 500 nm (B) 500 m (C) 200 nm (D) 5×10^7 m

9) When 6d orbital is complete, the entering electron goes into
(A) 7f (B) 7s (C) 7p (D) 7d

10) Which of the following molecules has zero dipole-moment?
(A) NH_3 (B) $CHCl_3$ (C) H_2O (D) BF_3

11) Which of the hydrogen halides has the highest percentage of ionic character?
(A) HCl (B) HBr (C) HF (D) HI

12) Calorie is equivalent to
(A) 0.4184 J (B) 41.84 J (C) 4.184 J (D) 418.4 J

13) 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

14) The solubility product of AgCl is 2.0×10^{-10} $mol^2\ dm^{-6}$. The maximum conc of Ag^+ ions in the solution is.
(A) 2.0×10^{-10} $mol\ dm^{-3}$ (B) 1.41×10^{-5} $mol\ dm^{-3}$ (C) 1.0×10^{-10} $mol\ dm^{-3}$ (D) 4.0×10^{-20} $mol\ dm^{-3}$

15) Molarity of pure water is
(A) 1 (B) 18 (C) 55.5 (D) 6

16) 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

17) The unit of the rate constant is the same as that of the rate of reaction is
(A) 1st order reaction (B) 2nd order reaction (C) Zero order reaction (D) 3rd order reaction

1118 (Inter Part - I) Warning:- Please, do not write anything on this question paper except your Roll No

Chemistry (Subjective) (Session 2015-17 to 2017-19) **Group (II)** **Paper (I)**

Time Allowed: 2.40 hours **Section ---------- I** Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) No individual neon atom in the sample of element has a mass of 20.18 amu. Explain.

(ii) What is the function of ionization chamber in mass spectrometer?

(iii) Write down limitations of a chemical equation. (iv) How are the crystals dried in a vacuum desiccator?

(v) What is R_f value? Give its formula.

(vi) Why the graph plotted between pressure and volume moves away from pressure axis at higher temperature.

(vii) What is absolute zero? What happens to real gases while approaching it?

(viii) How does kinetic molecular theory of gases explain Avogadro's law?

(ix) State Le-Chatelier's Principle. (x) Define common-ion effect. Give one example.

(xi) Briefly explain the effect of pressure on the equilibrium position for the dissociation of PCl_5

(xii) Define an acid and a base according to Lowry-Bronsted concept.

3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16

(i) Sodium is softer than Copper but both are very good conductor of electricity, give reason.

(ii) Ionic crystals do not conduct electricity in solid state, give reason .

(iii) Boiling needs a constant supply of heat, give reason.

(iv) Heat of sublimation of Iodine is very high, give reason.

(v) Bond angle in water is 104.5^o instead of 109.5^o, give reason.

(vi) Reactions between ionic compounds are very rapid, give reason.

(vii) π bonds are more diffused than σ bonds, give reason.

(viii) Define ionic radii and covalent radii. (ix) Define Lattice energy.

(x) Is it true that a non-spontaneous process never happen in universe? Explain it.

(xi) The concentration in term of molality is independent of temperature but molarity depends upon temperature, give reason.

(xii) Boiling point of solvents increase due to the pressure of solute, Justify.

4. Answer briefly any Six parts from the followings:- 6 × 2 = 12

(i) What are the defects in Rutherford's atomic model?

(ii) Why does the e/m value of positive rays for different gases are different but those for cathode rays, the e/m values are same.

(iii) Why does the size of He^+ is much smaller than H-atom although both H-atom and He^+ ion are monoelectronic systems?

(iv) Differentiate between Pauli's exclusion principle and Hund's rule?

(v) How is equilibrium set up between metal atoms of electrode and ions of metal in a cell?

(vi) How does a salt bridge maintain electrical neutrality in a cell?

(vii) How can impure Cu be purified by electrolytic process?

(viii) Justify that unit of rate constant of second order reaction is $dm^3\ mole^{-1}\ s^{-1}$ but the unit of rate of reaction is $mole\ dm^{-3}\ s^{-1}$

(ix) Why is the radioactive decay, a first order reaction?

Note: Attempt any three questions. Section ---------- II (8 × 3 = 24)

5. (a) Ethylene glycol is used as automobile antifreez. It has 38.7% Carbon, 9.7% hydrogen and 51.6% oxygen. Its molar mass is 62.1 gram mol^{-1}. Determine its emperical formula?

(b) Briefly explain the four properties of metallic crystals.

6. (a) What is Joule thomson effect? Explain Linde's Method of Liquefaction of gases.

(b) Mention four defects of Bohr's atomic model.

7. (a) Draw shapes of following molecules according to VSEPR theory.
(i) $BeCl_2$ (ii) BF_3 (iii) NH_3 (iv) H_2O

(b) Explain with diagram how enthalpy of a reaction can be measured by glass Calorimeter.

8. (a) Define common ion effect. Give its two applications.

(b) Give four Industrial Importance of electrolysis process.

9. (a) The boiling point of water is 99.725 °C. To a sample of 600 g of water are added 24 g of a solute having molecular mass of 58 $g\ mole^{-1}$, to form a solution. Calculate the boiling point of the solution.

(b) How does Arrhenius equation help us to calculate the energy of activation of a reaction?