MODEL PAPER "CHEMISTRY"

Intermediate Part-I Examination, 2008 & Onward

Roll No.
In Figures_____
In Words_____

OBJECTIVE

Time: 20Minutes **Marks: 17**

Note: Write your Roll No. in space provided. Over-writing, Cutting, Erasing, Using lead pencil will result in loss of marks.

Q.No.7. Each question has four possible answers. Choose the correct answer and encircle it. 17

(i) NH_3 burns in O_2 according to the following reaction:

$$4NH_{3(g)} + 3O_{2(g)} \longrightarrow 2\ N_{2(g)} + 6H_2O_{(g)}$$

(a)It shows that 1 mole of NH_3 will produce ½ mole of N_2.
(b)1 mole of NH_3 will produce 6 moles of N_2.
(c)For the complete reaction 2 moles of NH_3 and 20 g of O_2 are required.
(d)For the complete reaction, 2 moles of NH_3 and 40 g of O_2 are required.

(ii) Chromatography is the process which involves the distribution of a solute between:
(a)two mobile phases.
(b)a stationary phase and a mobile phase.
(c)two stationary and two mobile phases.
(d)two stationary phases.

(iii) Gases deviate from ideal behavior at high pressure. Which of the following is correct for non-ideality?
(a)At high pressure, the gas molecules move in one direction only.
(b)At high pressure, the collisions between the gas molecules are increased manifold.
(c)At high pressure, volume of the gas becomes insignificant.
(d)At high pressure, intermolecular attraction becomes significant.

(iv) Liquids evaporate at every temperature. When the temperature becomes constant for a liquid, then:
(a)rate of evaporation is greater than the rate of condensation.
(b)the rate of condensation is greater than the rate of evaporation.
(c)the rate of condensation and evaporation become equal.
(d)it depends upon the nature of the liquid.

(v) Ionic solids don't conduct the electrical current because:
(a)ions do not have translatory motion.
(b)free electrons are less
(c)the coordination number of the ion is very high
(d)strong covalent bonds are present in their structure.

(vi) In the ground state of an atom, the electron is present:
(a)in the nucleus. (b)in the second shell.
(c)nearest to the nucleus. (d)farthest from the nucleus.

(vii) Two electrons occupying an orbital are distinguished by:
(a)magnetic quantum number (b)principal quantum number
(c)azimuthal quantum number (d)spin quantum number

(viii) O_2 molecule is paramagnetic because:
(a)bonding electrons are equal to the anti-bonding electrons.
(b)bonding electrons are more than anti-bonding electrons.
(c)bonding electrons are less than anti-bonding electrons.
(d)it contains unpaired electrons.

(ix) NH_3 has a net dipole moment, but BF_3 has zero dipole moment, because:
(a)B is less electronegative than N.
(b)F is more electronegative than H.
(c)BF_3 is pyramidal, while NH_3 is planar.
(d)NH_3 is pyramidal, while BF_3 is trigonal planar.

(x) Whenever a reaction is endothermic, then it means that:
(a)heat is transferred from surrounding to the system
(b)heat is transferred from system to the surrounding
(c)heat content of the products is greater than those of the reactants
(d)heat content of the reactants is greater than those of products.

(xi) The solubility product of AgCl is 2.0×10^{-10} mol^2 dm^{-6}. The maximum concentration of Ag^+ ion 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}

(xii) The pOH of the solution is 4. The $[H^+]$ ion concentration of the solution is
(a)4 mol dm^{-3} (b)10^{-10} mol dm^{-3}
(c) 0.4 mol dm^{-3} (d) 4×10^{-4} mol dm^{-3}

(xiii) Colligative properties are obeyed by
(a)dilute solutions which behave as nearly ideal solutions.
(b)concentrated solutions which behave as nearly non-ideal solutions.
(c)both (a) and (b)
(d)neither (a) and (b)

(xiv) Which one of the following substances when dissolved in water gives acidic solution:
(a)NaCl (b)Na_2SO_4 (c)NH_4Cl (d)CH_3COONH_4

(xv) Which of the following statements 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.

(xvi) Electromechanical series is the arrangement of the electrodes in:
(a)increasing order of reduction potentials.
(b)decreasing order of reduction potentials.
(c)increasing order of oxidation reduction potential.
(d)there is no fixed arrangement.

(xvii) The rate of chemical reaction depends upon the nature of reactants because:
(a)some of the reactants have high boiling point.
(b)some of the reactants are coloured.
(c)energy of activation differs from one reaction to another.
(d)some of the reactants are solid at room temperature.

MODEL PAPER "CHEMISTRY"

Intermediate Part-I Examination, 2008 & Onward

SUBJECTIVE

Time: 2:40Hours **Marks: 68**

Note: - Attempt any TWENTY TWO (22) questions from Section -I and any THREE questions form Section-II

SECTION -I

Q.No.1. Attempt any TWENTY TWO (22) questions. **(22x2)=44**

(i) No individual neon atom in the sample of an element has a mass of 20.18 a.m.u. Justify it.

(ii) Justify that two grams of H_2, 16 g of CH_4 and 44 g of CO_2 occupy separately the volume of 22.414 dm^3 at STP although the sizes and masses of molecules of three gases are very different from each other.

(iii) Why the experimental yield is mostly less than the theoretical yield?

(iv) Which solvents are mostly used in crystallization?

(v) Mention the major steps involved in the crystallization.

(vi) Justify that the volume of given mass of a gas becomes theoretically zero at -273 ^oC.

(vii) Justify that 1 cm^3 of H_2 and 1 cm^3 of CH_4 at STP will have the same number of molecules. When one molecule of CH_4 is 8 times heavier than that of hydrogen.

(viii) Why the vapor pressures of water, ethyl alcohol and diethyl ether are different from each other at 0^oC?

(ix) A liquid boils at that temperature when its vapor pressure becomes equal to the external pressure. Why?

(x) Name the crystallographic elements of a unit cell, by sketching the unit cell.

(xi) Whichever gas is used in the discharge tube, the nature of the cathode rays remains the same. Why?

(xii) How do you come to know that the velocities of electrons in higher orbits are less than those in lower orbits of hydrogen atom?

(xiii) Why the photographic plate is white and a few dark lines are there in the line absorption spectra of a substance?

(xiv) Heisenberg's uncertainty principle has no relation with Bohr's atomic model. Justify it.

(xv) Why the ionization energies of III-A group elements are less as compared to II-A, although the values should increase from left to the right in a period?

(xvi) Why the first electron affinity for most of the elements is negative, while the second electron affinity for all the elements is positive?

(xvii) No bond in chemistry is 100% ionic. Justify it.

(xviii) What is the sequence of the molecular orbitals in nitrogen molecule?

(xix) The total energy of a system is the sum of translational, rotational and vibrational motions. Justify it.

(xx) How the amount of lattice energy of an ionic compound depends upon the charge densities of the ions?

(xxi) Why the equilibrium constant value has its units for some of the reversible reactions, but has no units for some other reactions?

(xxii) Why HCl acts as a weak acid in ethanoic acid as compared to, when dissolved in water?

(xxiii) One molal solution of urea in water is dilute as compared to one molar solution of urea, but the number of particles of the solute is same. Justify that.

(xxiv) When we plot a graph between temperature and compositions of binary liquid mixture, straight line is not obtained. We get two curves even for ideal solutions. Justify it.

(xxv) Why the boiling point of a solution of a non-volatile solute in a volatile solvent is always greater than the boiling point of a pure solvent?

(xxvi) Heat of solution of a substance is measured at infinite dilution. Why?

(xxvii) How copper can be purified electrolytically?

(xxviii) A salt bridge maintains the electrical neutrality in the cell. How?

(xxix) Na and K can displace hydrogen from acids but Pt, Pd and Cu cannot. Why?

(xxx) What is the difference between a cell and a battery?

(xxxi) The rate of chemical reaction is an ever changing parameter under the given conditions. Comment upon the statement.

(xxxii) The reactions happen due to collisions among the molecules, but all the collisions are not fruitful. Justify it.

(xxxiii) What are the controlling factors on the activity of the enzyme?

SECTION -II

Note: - Attempt any THREE questions. **(8x3)=24**

Q.No.2(a) Discuss the mass spectrometer to do the analysis of isotopes of an element. Mention the roles of electric and magnetic fields to separate the isotopes of an element. **(4)**

(b) Calculate the masses of 10^{20} molecules of each H_2 , O_2 and CO_2 at S.T.P. What will happen to the masses of these gases if temperature is increased by 100 ^{o}C and the pressure is decreased by 100 mm of Hg? **(4)**

Q.No.3(a) Define and give two examples of each of the properties of crystalline solids. **(5)**

(i)Isomorphism.
(ii)Polymorphism.
(iii)Transition temperature.
(iv)Allotropy.
(v)Anisotropy.

(b) How do you compare the spontaneous and non-spontaneous processes. Relate these properties of reactions with energy changes of reactions. **(3)**

Q.No.4(a) Justify various spectral lines for hydrogen atom by using the formula of energy difference of Bohr's model of hydrogen atom. **(5)**

(b) Calculate the pH of a buffer solution in which 0.11 molar CH_3 COONa and 0.09 molar CH_3COOH solutions are present. pKa for CH_3COOH is 4.78 . **(3)**

Q.No.5(a) Give three definitions of Raoult's law .Derive the formula of this law when both the components are volatile and give its graphical explanation. **(5)**

(b) Discuss the structure of ethene ($CH_2 = CH_2$) on the basis of sp^2 –hybridization of carbon atoms. **(3)**

Q.No.6(a) Give the rules for the balancing of redox reaction by ion –electron method and balance the following equation by this method. **(5)**

$$MnO_4^{-1}(aq) + C_2O_4^{-2}(aq) + H_2O \longrightarrow MnO_2(s) + CO_2(g) + OH^-(aq)$$

(b) Some of the reactions taking place around room temperature have activation energies around 50 kJ mol . **(3)**

(i) What is the value of the factor $e^{-Ea/RT}$ at 25 ^oC.

(ii) Calculate this factor at 35 ^oC and 45 ^oC . Prove that for every 10 ^oC increase of temperature, the factor doubles and so the rate constant also doubles.