CHEMISTRY 2019

Time: 2 Hours 40 Minutes Marks: 68

SECTION 'B' (SHORT-ANSWER QUESTIONS)

NOTE: Answer any Ten part questions. (40)

2.(i) Define the following:

* Random error * Exponential notation
* Deat of formation * Rate expression

(ii) Zinc reacts with H_2SO_4 (dil) as given below:

$$Zn + H_2SO_4 \xrightarrow{dil} ZnSO_4 + H_2$$

Calculate the mass of $ZnSO_4$, the volume of H_2 gas at S.T.P. and he number of molecules of H_2 gas which will be produced by reacting 163.5g of Zn with H_2SO_4.

(iii) An oranic compound contains 40% carbon, 6.67% hydrogen and 53.33% oxygen by mass. The molecular mass of the compound is 180. Find its empiricl and molecular formulae.

(iv) A 500 cm^3 vessel contains H_2 gas at 400 torr pressure and another 1 dm^3 vessel contains O_2 gas at 600 torr pressure. If these gases are transferred to 2 dm^3 empty vessel, calculate the pressure of the mixture of gases.

(v) What is Ideal gas. Derive the ideal gas equation.

(vi) Give any four scientific reasons of the following:

* Evaporation is a cooling process.
* Water has higher5 B.P. than Hydrogen fluoride although fluorine is more electronegative than Oxygen.
* The order of reaction is zero of photochemical reactions.
* Na^+ is smaller in size than Na atom.
* Milk sours more rapidly in summer than in winter.

(vii) State (n + l) rule. Write the electronic configuration of the following:

* Cu(Z = 29) * Sr^{++}(Z = 38) * S^-(Z = 16)

(viii) What is Covalent bond? Explain the Ionic character of Covalent bond.

(ix) Calculate theHeat of formation of Fe_2O_3 at 25°C:

* $2Fe + 3/2\ O_2 \rightarrow Fe_2O_3$ $\Delta H_f = ?$
* $H_2 + ½\ O_2 \rightarrow H_2O$ $\Delta H = -286 KJ / mole$
* $Fe_2O_3 + 3H_2O \rightarrow 2Fe(OH)_3$ $\Delta H = +289\ KJ / mole$
* $Fe + 3H_2O \rightarrow Fe(OH)_3 + 3/2\ H_2$ $\Delta H = +161\ KJ / mole$

(x) State and explain Hess's Law of Constant heat summation with its applications

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(xi) State le-Chatelier's Principle. Give its applications in the manufacture of SO_3 by Contact process.

(xii) The Ke for the reaction 2HI ===== $H_2 + I_2$ is 1.3×10^{-2}. If there are 0.5 mole / dm^3 of H_2 1.5 mole / dm^3 of I_2 and 5 mole / dm^3 HI, predict the direction in which the reaction moves to as to achieve the equilibrium.

(xiii) What are the main postulates of Arrhenius theory of ionization?

(xiv) Define Activation energy. Give its relationship with the speed of reaction.

(xv) Determine the order of reaction for:

$A + B \rightarrow$ Products from the following data:

S.No	A Moles / dm^3	B Moles / dm^3	Rate MS^{-1}
1	0.1	0.1	1×10^{-3}
2	0.2	0.1	4×10^{-3}
3	0.1	0.3	3×10^{-3}

SECTION'C' (DETAILED- ANSWER QUESTIONS)(28)

NOTE: Answer 2 questions from this section.

3.(a) Starting from $\Delta E = E_2 - E_1$ derive the expression for the wave number for hydrogas atom.

(b) Define Radioactivity. Describe the characteristic of Alpha and Beta rays.

(c) What is Unit cell? Sketch a unit cell and label the dimensions a, b, c and angles α, β, γ. How do cubic and tetragonal systems differ?

4.(a) Define Orbital Hybridization. Explain the shape of Ethene, C_2H_4 on the basis of hybridization.

(b) Explain the structure of BeCl2 and NH3 on the basis of Electron pair repulsion model and Hybrid orbital model.

(c) Differentiate any two of the following:

(i) Sigma bond and Pi – bond
(ii) Hydration and Hydrolysis
(iii) Line spectrum & Continuous spectrum

5.(a) What is Standard Electrode potential? How is theelectrude potential of Copper determined? Explain.

(b) Balance any one of the following equations by Ion – electron method:

(i) $Cr(OH)_3 + SO_4^{2-} \rightarrow CrO_4^{2-} + SO_3^{2-}$ *(Basic Medium)*

(ii) $MnO_4^- + Cl^* \rightarrow Mn^{2+} + Cl_2$ *(Acidic Medium)*

(c) Will Cadmium hydroxide precipitate from 0.02M sodution of $CdCl_2$ at pH = 10?

K_{sp} of $Cd(OH)_3 = 2.5 \times 10^{-14}$ $mole^2 / dm^6$