

2020

Time : 3 hours

Full Marks : 75

Candidates are required to give *their* answer in their own words as far as practicable.

Figures in the margin indicate full marks.

Answer six questions, selecting at least one from each group, in which Q. no. 1 is Compulsory.

1. Choose the correct answer of the following:

1½x10 = 15

(a) $FeCl_3$ is hydrolysed in solution to make it

- (i) Acidic
- (ii) Alkaline
- (iii) Neutral
- (iv) All of these

(b) The shape of $BeCl_2$ will be

- (i) Linear
- (ii) Triangular

(iii) V Shaped

(iv) Tetrahedral

(c) Which of the following is optically active

- (i) Malonic acid
- (ii) Citric Acid
- (iii) Lactic acid
- (iv) None of these

(d) Muds purify muddy water by:

- (i) Adsorption
- (ii) Dialysis
- (iii) Coagulation
- (iv) Forming a true solution

(e) Which alkali metal can be used in photoelectric cells?

- (i) Li
- (ii) Na
- (iii) K
- (iv) Cs

(f) Which of the following is involved in sandmeyer's reaction?

- (i) Ammonium salt
 - (ii) Cuprammonium salt
 - (iii) Diazonium Salt
 - (iv) Ferrous Salt
- (g) Oxidation of Secondary alcohol with $K_2Cr_2O_7 / H^+$ produces
- (i) An aldehyde
 - (ii) An ester
 - (iii) A Ketone
 - (iv) A carboxylic acid
- (h) The higher boiling points of carboxylic acids are due to:
- (i) Their acidic nature
 - (ii) Their dimerisation
 - (iii) Intermolecular hydrogen bonding
 - (iv) Both (ii) and (iii)
- (i) If the equivalent conductance of a certain solution of acetic acid is $39.07 \text{ ohm}^{-1}\text{cm}^2\text{equiv}^{-1}$. If $\lambda\alpha$ of CH_3COOH is 390.7, the degree of dissociation of acetic acid is

- (i) 0.75
 - (ii) 0.5
 - (iii) 0.2
 - (iv) 0.1
- (j) The oxidation potential of Mg and Al are +2.37 and +1.66 volt respectively. The Mg in chemical reaction
- (i) Will replace Al
 - (ii) Will be replaced by Al
 - (iii) Will not be able to replace Al
 - (iv) None of the above

"Group-A"

2. (a) What is meant by rate of reaction? Explain the factors which affect the rate of reaction. 2+4=6

(b) Prove that $t_{1/2} = \frac{0.693}{K}$ for 1st order reaction 6

3. (a) Explain Ostwald's law of dilution and discuss its limitations. 6+2=8

(b) Calculate the electrode potential of the following electrode at 25°C $Zn/Zn^{2+}(a=0.1)$ 4

Given that $E^\circ_{Zn^{2+}/Zn} = -0.7618$ volt

4. (a) Discuss the use of emf measurement for the determination of valency of ion. 8
 (b) Explain with examples 2×2=4
 (i) Isotone
 (ii) Isobar

5. Write notes on any two of the following: 6×2=12
 (i) Transport Number.
 (ii) Activation Energy
 (iii) Solubility Product
 (iv) Buffer Solution

"Group-B"

6. (a) Explain Heisenberg's Uncertainty Principle. 6
 (b) Discuss the significance of the wave function ψ and ψ^2 . 6
7. (a) Explain all the Nobel gas are diamagnetic. 6
 (b) Discuss nature of bonding in XeF_2 and XeF_4 . 3×2=6
8. (a) How is $K_2Cr_2O_7$ prepared? Calculate the equivalent weight of $K_2Cr_2O_7$ in different medium. 4+4=8
 (b) How does $K_2Cr_2O_7$ reacts with
 (i) Oxalic acid in presence of H^+
 (ii) H_2S in presence of H_2SO_4

9. Write short notes on any two of the following: 6×2=12
 (i) Chromyl Chloride Test
 (ii) Ionization Potential
 (iii) Sodium thiosulphate
 (iv) Nitrogenous Fertilizer

"Group-C"

10. (a) How Citric acid is isolated from lemon juice. 6
 (b) How does it reacts with 2×3=6
 (i) Hydroiodic acid
 (ii) H_2SO_4
 (iii) Acetyl Chloride
11. (a) How is benzene diazonium chloride is prepared? 6
 (b) How will you obtain the following compounds from benzene diazonium chloride? 1½×4=6
 (i) Phenol
 (ii) Benzoic Acid
 (iii) Benzene
 (iv) Nitrobenzene
12. (a) Explain electrophilic substitution reaction. 6
 (b) Describe the mechanism of nitration of benzene. 6
13. Write short notes on any two of the following: 6+6=12
 (i) Benzoin Condensation