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B.Sc. RNLKWC-/CC2T/22

2022

Chemistry

B.Sc. First Semester End Examination - 2022

PAPER - CC2T

Full Marks : 40

Time : 2 hours

*The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own
words as far as practicable.*

Illustrate the answers wherever necessary.

Group-A

1. Answer any five question : 5×2=10

- (a) What is the ground state term symbol of Sm^{3+} .
- (b) What is symbiosis.
- (c) Find the p^{H} of 0.01 (M) CH_3COOH Solution $\text{Pka}=4.74$.
- (d) Why electron affinity of chlorine is greater than fluorine.

(Turn Over)

(2)

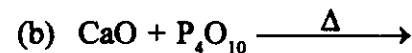
- (e) Write the cell reaction of a Daniel Cell.
- (f) What is Pauling exclusion principle.
- (g) The solubility of Silver Chloride is 0.00159 g/lit. Calculate its solubility product.
- (h) What is inert pair effect? Explain why sodium bismuthate (NaBiO_3) is highly oxidising in character.

Group - B

2. Answer any four question. 4×5=20

- (i) (a) 'Disproportionation and comproportionation reaction are actually redox reaction' –Justify with suitable example. 3
- (b) Calculate the number of α and β particles for the following change 2
- $${}_{92}^{238}\text{U} \rightarrow {}_{82}^{210}\text{Pb}$$
- (ii) (a) Arrange the following with increasing acid strength with reason.

(3)



Predict the product and hence explain the reaction by Lux-flood concept. 3+2

- (iii) (a) Internuclear distance in NaF is 215 pm. Calculate the radius of Na^+ & F^- from the concepts of Slater rule.
- (b) Write the acid & basic nature of HNO_3 in H_2O , NH_3 , HF medium separately give reason. 3+2
- (iv) (a) Explain why electrodeposition of Cu & Zn takes place simultaneously in presence of excess KCN.
- (b) Aqua regia is not more oxidising than Conc HNO_3 , but oxidation of S^{2-} to S in presence of Hg^{2+} takes place only in aqua regia not conc HNO_3 – Why? (2+3)

(4)

(v) (a) 1000 ml $\left(\frac{N}{10}\right)$ Mohr salt solution is titrated with $\left(\frac{N}{10}\right)$

KMnO_4 solution in 1(M) acid. Calculate the potential of the solution when

- (i) 99 ml KMnO_4 is added.
- (ii) the equivalent point reached.
- (iii) 100 ml of KMnO_4 is added.

Given $E^\circ_{\text{MnO}_4^-/\text{Mn}^{2+}} = 1.51$ volt

(b) Why Cu^+ is more stable than Cu^{2+} ? 3+2

(vi) Draw the nuclear binding energy curve and explain the following :

- (i) The tendency of lightest nuclei to undergo nuclear fusion
- (ii) heavier nuclei to undergo nuclear fission.

$2\frac{1}{2} + 2\frac{1}{2} = 5$

(5)

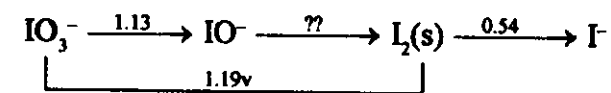
Group - C

3. Answer any one question. 1×10=10

(a) (i) Calculate $E^\circ_{\text{IO}_3^-/\text{I}^-}$ from the Latimer diagram and also

$E^\circ_{\text{IO}^-/\text{I}_2} = ?$

Given



(ii) What is reason of Lanthanoid contraction.

(iii) Calculate the energy of an electron in 2nd orbit of He^+ ion.

(iv) Write Heisenberg uncertainty principle. 4+2+2+2

(b) (i) AsO_4^{3-} oxidises I^- in dilute HCl medium while I_2 oxidises AsO_3^{3-} in a solution buffered with NaHCO_3 - explain.

(6)

(ii) The emf of a galvanic cell,

$\text{Zn(s)} / \text{Zn}^{+2}(2\text{M}) || \text{Cu}^{+2}(x \text{ m}) / \text{Cu(s)}$ in 0.86V.

If $E^\circ_{\text{Cu}^+/\text{Cu}} = 0.15\text{V}$ $E^\circ_{\text{Zn}^{+2}/\text{Zn}} = -0.76\text{V}$. Find the value of x.

(iii) Calculate velocity and de-Broglie wave length of an α -particle of energy kev. Mass of α -particle is 6.68×10^{-27} kg.

(iv) How standard potential depends on spontaniety of the cell. 3+3+3+1