(i) Printed Pages : 3

(ii) Questions : 9

Roll No. .....

Sub. Code : 0 3 4 8

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B.A./B.Sc. (General) 4th Semester

1046

CHEMISTRY (Same for B. Sc. Microbial & Food Technology)

Paper–XIII : Inorganic Chemistry-B

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note : Attempt **five** questions in all — **One** question from each Unit. Question No. **IX** is compulsory.

UNIT–I

I. (a) Why separation of Lanthanides is difficult ? Discuss the ion exchange method for the separation of Lanthanides.

(b) What are transuranium elements ? Give examples. 3,1

II. (a) Compare the following properties of lanthanides with actinides

(i) Oxidation States

(ii) Complex formation

(iii) Tendency to form O × O - anions.

(b) Explain any $Ca(OH)_3$ is more basic than $Cu(OH)_3$. 3,1

UNIT–II

III. (a) Explain the relative basicity of pyridine, 2 - methyl pyridine and 4 - methyl pyridine with respect to Lewis Acid B $(CH_3)_3$.

(b) What are Amphoteric substances ? Explain with an example giving reactions. 2,2

IV. (a) Trimethylamine is more basic than NH_3. Explain.

(b) Arrange the following in order of their increasing pk_a values and also give reasons : $HClO_1$, $HClO_2$, $HClO_3$, $HClO_4$.

(c) What is Lux-Flood System of Acids and Bases ? Explain with an example. 1½,1½,1

UNIT–III

V. (a) What is the significance of Pourboix Diagram ?

(b) The reduction potentials are :

$Cu^{2+} + e^- \rightarrow Cu^+ E^0 = +0.15V$, $Cu^+ + e^- \rightarrow Cu\ E^0 = +0.50$ V. Calculate the value for $Cu^{2+} \rightarrow Cu$ and draw Latimer diagram. Also predict whether Cu^+ is unstable w.r.t. disproportionation in aqueous solution or not. 1,3

VI. (a) What is Frost diagram ? Construct a Frost Diagram from given Latimer diagram for Thallium :

$T\lambda^{3+}$ $\underline{1.26\ V}$ $T\lambda^+$ $\underline{-0.34\ V}$ $T\lambda$

$+0.73V$

(b) What do you understand by the term redox stability in water ? 3,1

UNIT–IV

VII. (a) Discuss the Autoionisation of liquid SO_2 as a non-aqueous solvent. Explain acid-base reactions in it.

(b) What are the species characteristics of Acids and Bases in Liquid NH_3 ? 3,1

VIII. (a) In what respect Liquid NH_3 is a better solvent than water ?

(b) Explain why Liquid SO_2 is a better solvent for organic compounds. 3,1

UNIT–V

IX. (a) Which Lanthanide is radioactive ?

(b) Name the element which is formed by β-decay of Neptunium.

(c) Classify as Lewis acid and Lewis base - Ni^{2+}, OH^-.

(d) In the reaction $SnCl_2 + 2\,HgCl_2 \rightarrow SnCl_4 + HgCl_2$ label the Oxidizing and reducing agent.

(e) Complete the reaction :

$$PbI_2 + KNH_2 \xrightarrow{\text{Liq } NH_3} ?$$

(f) What is the oxidation state of Uranium in UO_2^{2+} and UO_2^{+} ? 1×6=6