

**U.G. 4th Semester Examination - 2021****CHEMISTRY****Course Code : BCEMCCHC402****Course Title : Inorganic Chemistry-III**

Full Marks : 30

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.*1. Answer any **ten** questions from the following:

1×10=10

- Write the formula of Talc.
- Name an ore of lithium and give its formula.
- Draw the structure of  $P_4S_3$ .
- State the oxidation state of Sulfur in Caro's acid.
- Cite one example of each of 3C-4e and 3C-2e bonds.
- Draw the structure of the product formed by the hydrolysis of  $Me_2SiCl_2$ .

- Draw the structure of carbon suboxide.
- Which one of the following alkali metal ions have lowest ionic mobility in aqueous solution?

 $Li^+, Na^+, K^+, Rb^+, Cs^+$ 

- Write down the product of Ammonolysis of  $S_2Cl_2$  in an inert solvent.
- The existence of two different colored complexes of  $Co(NH_3)_4Cl_2$  is due to \_\_\_\_\_.
- Write down the product of the reaction of  $XeF_2$  with  $AsF_5$  in 1:1 ratio.
- Comments on the magnetic behavior of alkali metals solution in ammonia.
- Write down the products of the reaction of  $P_2O_5$  with  $HNO_3$  and  $HClO_4$ , respectively.
- What is the basic difference between Ore and Mineral?
- What do you mean by Pyrometallurgy?

2. Answer any **five** questions from the following:

2×5=10

- $PCl_5$  is exist but  $BiCl_5$  does not exist. Explain.
- Compare the B-F bond lengths in between  $BF_3$  and  $BF_4^-$  with proper explanation.

[Turn Over]

- c) The crystalline salts of alkaline earth metals contain more molecules of water of crystallization than the corresponding salts of alkali metals. Explain.
- d)  $\text{SO}_2$  can act as a reducing agent or oxidizing agent but  $\text{SO}_3$  can act only as an oxidizing agent. Why?
- e) Write down the complete reaction in between  $\text{XeF}_6$  and water.
- f)  $\text{CO}_2$  is a monomeric gas whereas  $\text{SiO}_2$  is a polymeric solid. Explain.
- g) The  $\text{BCl}_3$  and  $\text{NH}_4\text{Cl}$  were heated at  $140^\circ\text{C}$  to give a compound X, which when treated with  $\text{NaBH}_4$  gave another compound Y. Identify X and Y.
- h) What is the difference between bidentate ligand and ambidentate ligand? Give example.

3. Answer any **two** questions from the following:

$$5 \times 2 = 10$$

- a) i) Draw the structure of all possible isomers of the complex  $[\text{Co}(\text{en})_2(\text{NH}_3)\text{Cl}]^{2+}$  {en = ethylene diamine}.

ii) Electrolytic reduction method is preferred over carbothermic reaction for extraction of highly electropositive metal like Na. Explain.  $3+2=5$

b) i) Selenic acid is stronger oxidant than sulfuric acid. Explain.

ii) Discuss the structure and bonding in trimer  $[\text{N}(\text{PCl}_2)_3]_3$ .  $2+3=5$

c) i) The Ellingham diagram for formation of metallic oxide from metal basically shows a positive slope. Explain.

ii) The standard reduction potential values for two metals A and B are  $E_{\text{A}^+/\text{A}}^0 = -2.71\text{V}$  and  $E_{\text{B}^+/\text{B}}^0 = +0.80\text{V}$ . Which metal is expected to exist in native state and which metal is expected to exist in combined state in earth crust?  $2\frac{1}{2} + 2\frac{1}{2} = 5$