

INTERNAL EVALUATION TEST, 2019

SEM-3

INORGANIC CHEMISTRY

TOPICS: ACID-BASE

Full Marks: 25

Times: 1 hrs. 30 Mins.

**Answer any following questions, not exceeding 25 marks.**

1. State two limitations of Lewis concept of acid and base. 2
2. Which of the following is the weakest base and why?  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{F}^-$ . 2
3. Discuss the relative strength of acids like  $\text{HClO}_4$ ,  $\text{HBr}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HCl}$ ,  $\text{HNO}_3$  in water and in acetic acid medium. 3
4. Bisulphite ion can be viewed both as an acid and a base. Explain. 2
5. Arrange  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{BBr}_3$  and  $\text{BI}_3$  in order of their Lewis acidity. 2
6. Classify the following as hard/soft acid base. 2  
(a)  $\text{H}^-$             (b)  $\text{Ni}^{4+}$             (c)  $\text{I}^+$             (d)  $\text{H}^+$
7. Explain the complexing ability of the halide ions show the reverse trend with  $\text{Al}^{3+}$  and  $\text{Hg}^{2+}$ :  
 $\text{Al}^{3+}$ :  $\text{I}^- < \text{Br}^- < \text{Cl}^- < \text{F}^-$   
 $\text{Hg}^{2+}$ :  $\text{I}^- > \text{Br}^- > \text{Cl}^- > \text{F}^-$  3
8. What is known as cosolvating agents? Explain the term with example. 2
9. Explain on the basis of HSAB principle that among the linkage isomer  $[\text{Co}(\text{NH}_3)_5(\text{SCN})]^{2+}$  and  $[\text{Co}(\text{NH}_3)_5(\text{NCS})]^{2+}$  which one is more stable and why? 3
10. Identify Lewis acid-base in the following reactions: 3  
(a)  $\text{FeCl}_3 + \text{Cl}^- \rightarrow [\text{FeCl}_4]^-$ , (b)  $\text{BrF}_3 + \text{F}^- \rightarrow [\text{BrF}_4]^-$ , (c)  $\text{KH} + \text{H}_2\text{O} \rightarrow \text{KOH} + \text{H}_2$
11. Why water is known as leveling solvent? 2
12. Name the conjugate acid and conjugate base of  $\text{HX}^-$  and  $\text{X}^{2-}$ . 2
13. Which one  $\text{NH}_2^-$  and  $\text{PH}_2^-$  is the better base towards proton? Explain. 2
14. Which of the following reactions will proceed to the right hand side? 3  
(a)  $\text{CuCl}_2 + 2\text{KI} \rightarrow 2\text{KCl} + \text{CuI} + 1.5\text{I}_2$   
(b)  $\text{BeI}_2 + \text{HgF}_2 \rightarrow \text{BeF}_2 + \text{HgI}_2$   
(c)  $\text{CdCl}_2 + \text{H}_2\text{S} \rightarrow 2\text{HCl} + \text{CdS}$
15. What is symbiosis? 2