

[A-12]

SEAT No. \_\_\_\_\_

No. of Printed Pages : 2

50

**SARDAR PATEL UNIVERSITY**

**4<sup>th</sup>-Semester B. Sc. EXAMINATION (2010-batch)**

**Monday, 8<sup>th</sup> April 2019**

**10.00 am TO 1.00 pm**

**INORGANIC CHEMISTRY (US04CCHE01)**

**Total Marks: 70**

**Q-1 Multiple choice question**

**[10]**

- I. d-block elements lie in between \_\_\_\_\_ elements.  
(a) s- and p-block (b) s- and f-block (c) p- and f-block (d) none of above
- II. As we move along particular series the melting points of the elements increase up to \_\_\_\_\_ in the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> series respectively.  
(a) Cr, Te, Re (b) T, Mo, W (c) Cr, Mo, W (d) V, Nb, W
- III.  $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$  is blue green where as  $[\text{Ni}(\text{NH}_3)_6]^{2+}$  is \_\_\_\_\_.  
(a) Yellow (b) red (c) blue (d) blue green
- IV. Which of the following compound is not paramagnetic?  
(a)  $[\text{Zn}(\text{NH}_3)_4]$  (b)  $\text{K}_3[\text{TiF}_6]$  (c)  $\text{Na}_3[\text{FeF}_6]$  (d)  $[\text{Cr}(\text{H}_2\text{O})_6]\text{SO}_4$
- V. The primary oxidation state of metal in a complex compound always satisfy by \_\_\_\_  
(a) anion (b) cation (c) ligand (d) non of above
- VI. Which of the following square planar complexes exist in cis and trans isomeric form?  
(a)  $\text{Ma}_2\text{b}_2$  (b)  $\text{Ma}_4$  (c)  $\text{Ma}_3\text{b}$  (d)  $\text{Mabcd}$
- VII. The most characteristics oxidation state of lanthanide is \_\_\_\_\_.  
(a) +1 (b) +2 (c) +3 (d) +4
- VIII. Which extractant is used in solvent extraction method?  
(a)  $\text{Al}(\text{NO}_3)_3$  (b)  $\text{K}_2\text{Cr}_2\text{O}_7$  (c) (TBP) (d)  $\text{BiPO}_4$
- IX. Which of the following is not soft acid?  
(a)  $\text{Li}^{3+}$  (b)  $\text{Cu}^+$  (c)  $\text{Al}^{3+}$  (d)  $\text{CO}_2$
- X. Which of the following metallic carbonyl is not diamagnetic?  
(a)  $[\text{Co}(\text{CO})_6]$  (b)  $[\text{V}(\text{CO})_6]$  (c)  $[\text{Fe}(\text{CO})_5]$  (d)  $[\text{Ni}(\text{CO})_4]$

**Q-2 Attempt any six**

**[12]**

- I. Give and explain variation of densities on moving down the sub group for d-block elements.
- II. Why d-block elements show variable oxidation states?
- III. Which transition metal complex ions are colourless? Why?
- IV. Define EAN of central metal ion in coordination compound and calculate EAN of  $\text{Cr}^{3+}$  ion in  $[\text{Cr}(\text{NH}_3)_6]^{3+}$ .
- V. Give condition for a molecule to show optical isomerism.
- VI. List the modern methods used for the separation of Lanthanides.
- VII. Relative strength determination of acid-base is very difficult, explain.
- VIII. Classify the metallic carbonyls giving suitable examples.

**Q-3 Attempt the following.**

**[08]**

- (a) Give name symbol, complete and valence shell electronic configuration of 2<sup>nd</sup> transition series elements.
- (b) (i)  $\text{K}_2[\text{PtCl}_6]$  is well known compound of Pt(IV), where as  $\text{K}_2[\text{NiCl}_6]$  does not exist at all.  
(ii)  $\text{Ti}^{4+}$  is more stable than  $\text{Ti}^{3+}$ , explain.

**OR**

①

(P.T.O)

- Q-3 Attempt the following.** [08]
- Give name symbol, complete and valence shell electronic configuration of 2<sup>nd</sup> transition series elements.
  - Discuss variable oxidation states shown by d-block elements of 1<sup>st</sup> transition series under headings
    - +1 and +2 oxidation states
    - Stability of lower oxidation states
    - High oxidation states
- Q-4 Attempt the following.** [08]
- How will you determine the paramagnetic or diamagnetic nature of a given substance?
  - Write a note on metallic carbides of transition metal.
- OR**
- Q-4 Attempt the following.** [08]
- Explain the purple colour of octahedral  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  ion by d-d transition.
  - How will you determine the paramagnetic or diamagnetic nature of a given substance?
- Q-5 Attempt the following.** [08]
- Explain the basic postulates of Werner's coordination theory.
  - Describe a chemical method to distinguish between cis and trans isomers of the complex  $[\text{Pt}(\text{NH}_3)\text{Cl}_2]^0$ .
- OR**
- Q-5 Attempt the following.** [08]
- Draw the structure of all the possible isomers of the  $[\text{Cr}(\text{NH}_3)_2(\text{H}_2\text{O})_2\text{Br}_2]^+$  complex ion.
  - On the basis of EAN rule, predict the number of unpaired electrons and  $\mu$  value of the following complexes. (i)  $[\text{Cu}(\text{NH}_3)_4]^{2+}$  (ii)  $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$
- Q-6 Attempt the following.** [08]
- What are Lanthanides? Write their atomic numbers, symbols, names, observed and expected electronic configurations.
  - Discuss the separation of Lanthanides by solvent extraction method.
- OR**
- Q-6 Attempt the following.** [08]
- Discuss the position of Lanthanides in the periodic table.
  - Discuss the various oxidation states of Actinides.
- Q-7 Attempt the following.** [08]
- Give brief account on Arrhenius acid-base concept with its utility and limitations.
  - Explain solvation and solvolysis reaction.
- OR**
- Q-7 Attempt the following.** [08]
- Write a note on Usanovich concept of acid-base.
  - Explain the term levelling effect in terms of aqueous and non-aqueous solvents.
- Q-8 Discuss the preparation, properties and structure of Tri-iron dodecacarbonyl** [08]  
 $[\text{Fe}_3(\text{CO})_{12}]$ .
- OR**
- Q-8 Discuss the general physical and chemical properties of metallic carbonyls.** [08]