

淡江大學 97 學年度碩士班招生考試試題

系別：化學學系

A

科目：無機化學

本試題共 1 頁，10 大題

1. 按照題目順序作答

2. 每題十分

3. 需詳細的把推理及思考的過程書寫清楚，不可只有答案

1. The magnetic moment of $[\text{NH}_4]\text{V}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ is $2.8 \mu_B$ and the electronic spectrum of an aqueous solution contains three absorption bands in visible range. Explain these observations.
2. Would the following species to be expected to be a Jahn-Teller distorted structure? (a) $[\text{CuCl}_4]^{2-}$ (b) $[\text{CoF}_6]^{3-}$ (c) $[\text{Co}(\text{NH}_3)_6]^{3+}$.
3. Show diagrammatically the splitting of *d* orbital, energy-wise, in (a) octahedral (b) trigonal bipyramidal and (c) square planar fields.
4. Discuss the mechanism of an inner sphere and an outer sphere electron transfer reaction in coordination complexes.
5. Give an example and explain the following terms: (a) migration reaction, (b) σ - π rearrangement, and (c) oxidative-addition reaction.
6. Suggest structure for the complex $\text{LFe}(\text{CO})_3$ where L = cycloheptatriene. How is the bonding mode of the ligand affected on going from $\text{LFe}(\text{CO})_3$ to $\text{LMo}(\text{CO})_3$?
7. Give the structural types expected for the following clusters: (a) $[\text{Ru}_6(\text{CO})_{18}]$, (b) $[(\text{CO})_8\text{Fe}_3(\text{C}_2\text{Ph}_2)_2]$ (C_2Ph_2 is acetylene) (c) $[\text{B}_2\text{C}_7\text{H}_{13}]$
8. Draw the Lewis (with resonance) structures of CNO^- and OCN^- . Indicate which contribution structure in their resonance form is more important. One of the two species is explosive. Suggest an explanation.
9. Assign the point group for the following molecules.
(a) ferrocene (b) $\text{B}(\text{OH})_3$ (c) *cis*- $[\text{FeCl}_2(\text{H}_2\text{O})_4]$.
10. The ionic radius of Be^{2+} , Mg^{2+} and O^{2-} is 41 pm, 80 pm, and 126 pm, respectively. Based on the radius ratio model predict the coordination numbers and lattice structure of BeO and MgO .