

系所組：化學系應用化學碩士班

日期節次：100 年 3 月 20 日 第 2 節 11:00-12:30

科目：無機化學

1. For each of the following molecules or ions, on the base of VSEPR model,
(1) XeClFO (2) NCO^- (3) TeF_4 (4) I_3^- (5) SNO^- (每小題六分共三十分)
 - (a) draw the Lewis structure
 - (b) predict the geometry (shape)
 - (c) assign its point group
 - (d) predict its optical activity
 - (e) find formal charge and oxidation number for central atom
2. Predict and explain the order of proton affinities for (每小題十分共三十分)
 - (a) NH_3 , HN_3 , $\text{N}(\text{CH}_3)_3$, NF_3
 - (b) pyrrole, pyridine, 2-methylpyridine, 2,6-dimethylpyridine
 - (c) NH_3 , NH_2^- , NH_2^- , $\text{C}_5\text{H}_5\text{N}$, CH_3CN
3. For (1) $\text{Co}(\text{H}_2\text{O})_6^{3+}$ (2) RuCl_3 (3) $\text{Ni}(\text{CO})_4$ and (4) $\text{Fe}(\text{CN})_6^{3-}$
(每小題七分共二十八分)
 - (a). Predict the number of unpaired electrons
 - (b). Determine the magnetic dipole moments
 - (c). Find ligand field stabilization energies
 - (e). Discuss the Jahn-Teller distortion
4. Which one of the following complexes has the highest C-O stretching frequency? (本題十二分)
(a) $\text{Fe}(\text{CO})_6^{2+}$ (b) $\text{Mn}(\text{CO})_6^+$ (c) $\text{Cr}(\text{CO})_6$ (d) $\text{V}(\text{CO})_6^-$ (e) $\text{Ti}(\text{CO})_6^{2-}$