

系所組：化學系應用化學碩士班

日期節次：103 年 3 月 15 日 第 2 節 11:00~12:30

科目：無機化學

1. For $\text{Co}(\text{H}_2\text{O})_6^{3+}$ and MnO_4^-
- (a) Calculate the ligand field stabilization energy (LFSE). 6%
 - (b) Find the magnetic dipole moment. 4%
 - (c) Construct MO energy level diagram. 10%
 - (d) How many UV-Visible absorption peaks will be seen for d-d transition. 4%
 - (e) Do they show Jahn-teller distortion? 4%
2. For each of the following molecules or ions, predict:
(1) XeOF_5^- (2) N_2O (3) PBr_2Cl_3 (4) H_2O_2 . 32% (8% for each)
- (a) the Lewis structure,
 - (b) the point group,
 - (c) the expected hybrid orbitals on the central atom,
 - (d) determine the oxidation number of the central atom.
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3. (a) Construct a MO energy level diagram for CH_2 molecule. 15%
Label HOMO and LUMO in your answer.
- (b) Should CH_2 be paramagnetic or diamagnetic? 5%
4. Give the electron count for the following: 10%
- (a) $\text{V}(\text{CO})_6$ 10%
 - (b) $\text{IrH}_2\text{Cl}(\text{CO})(\text{PPh}_3)_2$ 10%