中國文化大學 103 學年度碩士班考試入學招生考試

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 $Co(H_2O)_6^{3+}$ 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.

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) $V(CO)_6$ 10%

(b) $IrH_2Cl(CO)(PPh_3)_2$ 10%