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, $N(CH_3)_3$, NF_3
   (b) pyrrole, pyridine, 2-methylpyridine, 2,6-dimethylpyridine
   (c) NH_3, NH_2^-, NH_2^-, C_5H_5N, CH_3CN

3. For (1) $Co(H_2O)_6^{3+}$ (2) $RuCl_3$ (3) $Ni(CO)_4$ and (4) $Fe(CN)_6^{3-}$
   (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) $Fe(CO)_6^{2+}$ (b) $Mn(CO)_6^+$ (c) $Cr(CO)_6$ (d) $V(CO)_6^-$ (e) $Ti(CO)_6^{2-}$