

系所組：化學系應用化學碩士班

日期節次：102 年 3 月 15 日 第 2 節 11:00~12:30

科目：無機化學

1. For each of the following molecules or ions, 24%
  - (a)  $\text{TeCl}_4$  (b)  $\text{XeO}_2\text{F}_2$
  - (1) write the Lewis structure
  - (2) predict the molecular geometry
  - (3) assign the point group
  - (4) give the hybrid orbitals on the central atom
  - (5) find the formal charge of the central atom
  - (6) determine the oxidation number of the central atom.
  
2. For  $\text{H}_3\text{PO}_4$ ,  $\text{H}_3\text{PO}_3$ , and  $\text{H}_3\text{PO}_2$ 
  - (a) Give names in English 9%
  - (b) Draw the molecular structures 6%
  - (c) Estimate the acid dissociation constants ( $K_a$ ) or  $\text{p}K_a$  for  $\text{H}_3\text{PO}_4$ . 7%
  
3. For each of (a)  $\text{Mo}(\text{CO})_6$  and (b)  $[\text{Ni}(\text{CN})_4]^{2-}$  24%
  - (1) Predict the magnetic moment.
  - (2) Find ligand field stabilization energy (LFSE).
  - (3) Determine the ground term (term symbol of ground state).
  - (4) Assign point group.
  - (5) Which species will show Jahn-Teller distortion?
  - (6) Which species are paramagnetic?
  
4. Briefly explain the following terminologies by examples: 30%
  - (1) dissociation (D)
  - (2) oxidative addition
  - (3) cluster compounds.