淡江大學 109 學年度碩士班招生考試試題

13-1

系別：化學學系　　科目：普通化學

考試日期：3 月 8 日(星期日) 第 2 節　　本試題共 5 大題， 1 頁

1. (20 pts) For a catalytic reaction, which of the following is/are changed?
   (a) activation energy
   (b) reactants,
   (c) transition state
   (d) ΔE of products and reactants
   (e) reaction pathway

2. (15 pts) Explain the following terms:
   (a) reaction intermediate
   (b) rate determining step
   (c) Lanthanide contraction

3. (10 pts) Using VSEPR to predict the structures of molecules with 5 electron pairs around the central atom for (a) AB_4 (b) AB_3.

4. (30 pts) For N_2, (the electronic configuration of N: $2s^2 2p^3$)
   (a) give the valance MO energy level diagram of the ground state (g.s.). Label the frontier molecular orbitals.
   (b) give the valance MO energy level diagram of the first excited state (e.s.).
   (b) Give the bond orders in g.s. and e.s..

5. (25 pts) Answer the following answers.
   (a) Draw d_{xy} and d_{z2} orbitals with coordinate axis.
   (b) Define 'formal charge'.
   (c) Define 'isoelectronic'.
   (d) When filling electrons in polyelectronic elements, why 4s fills before 3d orbital?