

注意：所有題目必須在答案卷上作答

- 1) Based on the electron configuration for the O_2 molecule, $\sigma_{1s}^2 \sigma_{1s}^{*2} \sigma_{2s}^2 \sigma_{2s}^{*2} \sigma_{2p}^2 \pi_{2p}^4 \pi_{2p}^{*2}$, (a) explain why the molecule is paramagnetic (5%) and calculate the bond order (5%).
- 2) Follow the example shown in question (1), and write down the electron configuration for F_2^+ and B_2 (10%)
- 3) Give formulas for each of the following names: (a) Potassium tetrachlorocobaltate(II) and (b) aquatricarbonylplatinum(II) bromide. (10%)
- 4) Use VSEPR theory to draw the structures for (a) ClF_3 and (b) NO_2 (10%)
- 5) Explain why the bond angle, $\angle H-O-H$, in H_2O is smaller than the bond angle, $\angle H-N-H$, in NH_3 (10%)
- 6) For reactions of the type: $aA \rightarrow \text{products}$ that are zero, first, or second order in $[A]$, (a) find the rate laws (6%) and (b) derive the integrated rate laws (必須寫出推導過程) (9%)
- 7) Draw the structures for (a) 1,3-bromobenzene, (b) 2,2,4-trimethylpentane, (c) formaldehyde, (d) ethyl acetate, and (e) phenol (15%)
- 8) Sketch all the geometrical and optical isomeric structures for (1) tetrahedral $Mabcd$ and (b) square planar $Mabcd$, where M is a metal atom, coordinated with four monodentate ligands of a , b , c , and d (8%) (構造錯誤或多寫, 將倒扣至本題零分爲止)
- 9) According to Crystal Field Theory, find the electronic configurations and calculate the CFSE in Dq values for a d^3 complex in an octahedral crystal field and a d^7 complex in a tetrahedral crystal field (12%)