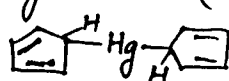
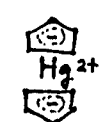


- Write out the electron configuration for the following species:  
 (a)  $39\text{Y}^{2+}$  (b)  $53\text{I}$  (c)  $29\text{Cu}^+$  (6%)
- Explain why the chemical bond in a  $\text{Li}_2$  molecule is weaker than that in a  $\text{H}_2$  molecule. (6%)
- Explain why  $\text{KCl}$  is more subject to Schottky defects than to Frenkel defects? (4%)
- Predict the molecular geometry for (a)  $\text{SnCl}_2$  ( $50\text{Sn}$ ) (b)  $\text{TeCl}_4$  ( $52\text{Te}$ ) and give your explanations. (8%)
- Write the chemical formula for each of the following compounds:  
 (a) hypochlorous acid (b) potassium hexacyanoferrate(III)  
 (c) ferrocene (d) sodium bis(thiosulfato)argentate(I) (8%)
- For  $\text{CsF}$  and  $\text{CsBr}$ , which one is more soluble in water? Why? (4%)
- $\text{AlF}_3$  is almost insoluble in anhydrous  $\text{HF}$  but it dissolves readily when  $\text{NaF}$  is added. Explain it! (4%)
- Explain why adding ammonium acetate to  $\text{Zn}(\text{NH}_2)_2$  (s) in  $\text{NH}_3$ (l) causes the solid to dissolve. (5%)
- Using the simple crystal field theory, explain why  $[\text{Ni}(\text{CN})_4]^{2-}$  is diamagnetic while  $[\text{NiCl}_4]^{2-}$  is paramagnetic. ( $28\text{Ni}$ ) (6%)
- Discuss the  $^1\text{H}$ -NMR spectra for (a)  (b)  (8%)
- Compare the stretching frequency of the  $\text{CO}$  bond for the following metal carbonyls and give explanations.  
 $[\text{Mn}(\text{CO})_6]^+$ ,  $[\text{Cr}(\text{CO})_6]$ ,  $[\text{V}(\text{CO})_6]$  (8%)
- Write the major product for each of the following reaction:  
 (a)  $\text{HgSO}_4 + 2\text{Mn}(\text{CO})_5 \longrightarrow$   
 (b)  $(\text{C}_5\text{H}_5)_2\text{Ni} + \text{C}_2\text{F}_4 \longrightarrow$  (9%)  
 (c)  $(\text{C}_5\text{H}_5)\text{Mo}(\text{CO})_3\text{H} + \text{NO} \longrightarrow$

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13. Give two detecting methods in common use for the high performance liquid chromatography (HPLC). (6%)
14. Give two acids frequently used as a primary standard for NaOH solutions. (6%)
15. Describe the separation method for each of the following mixtures:  
(a)  $PbCl_2(s)$  and  $Hg_2Cl_2(s)$   
(b)  $HgS(s)$  and  $CdS(s)$   
(c)  $NiS(s)$  and  $ZnS(s)$
- (12%)
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