1. Which one is a separation method (A) UV (B) AA (C) CE (D) NMR　(5 points)

2. Normally, what sauce of radiation is obtained by D_2-lamp?　(5 points)
   (A) X-ray (B)UV (C) IR (D)Visible

3. Describe the preparation of 1.0 L of 0.50 M from a concentrated solution that has a density of 1.18 g/mL and is 36.5 % (W/W) HCl (36.5 g/mol)　(10 points)

4. Balancing the following redox equation by supplying H^+ and /or H_2O as needed in a balanced reaction.
   (a) MnO_4^- + NO_2^- = Mn^{2+} + NO_3^-　(5 points)

5. The equilibrium constant for the reaction:　$2CrO_4^{2-} + 2H^+$ = $Cr_2O_7^{2-} + H_2O$　is 4.2×10^{14}.
   The molar absorptivities at 345 nm for the two principal species in a solution of $K_2Cr_2O_7$ are $\varepsilon_1(CrO_4^{2-})$ = 1.84×10^3, and $\varepsilon_2 (Cr_2O_7^{2-})$ = 10.7×10^2.　One solution was prepared by dissolving 1.00×10^{-4} mole of $K_2Cr_2O_7$ in water and diluting to 1.00 L with a pH 5.60 buffer.　Derive theoretical absorption values (1.00-cm cells) for this solution at 345 nm. (15 points)

6. Describe the difference in application between HPLC and GC?　(5 points)

7. Describe the principle of mass spectrometry and its application? (5 points)