1. A salt-mixture solution contains 1.0 M NaCl, 0.5 M $MgCl_2$ and 0.2 M $CaCl_2$. What is the ionic strength of this solution. (10%)
2. Calculate the pH of a solution that is 0.07 F in NH_3 and 0.28 F in NH_4Cl. The basic dissociation constant for NH_3 is 1.76×10^{-5}. (20%)
3. Oxygen in water is usually determined by the Wrinkler titration method. When a 100 mL sample is treated with Mn^{2+} reagent in alkaline condition and with excess I^-, a brownish precipitate will form.
   $O_2 + 2Mn^{2+} + 4OH^- \rightarrow 2MnO(OH)_2$
   The precipitate will be dissolved upon adding acid and I_2 molecule is released:
   $MnO(OH)_2 + 4I^- + 6H^+ \rightarrow Mn^{2+} + 2I_2 + 3H_2O$
   Iodine is titrated with 12 mL 0.1 M NaS_2O_3 with starch as an indicator:
   $I_2 + 2S_2O_3^{2-} \rightarrow S_4O_6^{2-} + 2I^-$
   What is the concentration of dissolved oxygen in that sample? (20%)
4. Describe the principle of inductively coupled plasma atomic emission spectrometer (ICP-AES). (20%)
5. What is HETP (height equivalent to a theoretical plate) in a chromatographic column. (10%) How does it relate to the efficiency of separation. (5%)
6. Describe the meaning of van Deemter Equation: $H=A+B/u+Cu$. (10%) How to derive the optimal volecity as $u_{opt}=\mathrm{sqrt}(B/C)$. (5%)

試題隨卷繳回