

## Self-Quiz Complexometric Titrations (EDTA)

### CHEM 201

1. At pH 7.00, calculate the  $[\text{Zn}^{2+}]$  in a solution having an analytical zinc concentration of  $1.00 \times 10^{-3} \text{ M}$  and  $1.00 \times 10^{-6} \text{ M}$  in uncomplexed EDTA.
  
2. Find the concentration of free  $\text{Mg}^{2+}$  in  $0.050 \text{ M Na}_2 [\text{Mg}(\text{EDTA})]$  at pH 9.00.
  
3. Calculate the conditional formation constant of the complex  $[\text{NiY}]^{2-}$ ,  $K_{\text{NiY}^{2-}}$ , in a buffer containing  $0.050 \text{ M NH}_3$  and  $0.090 \text{ M NH}_4\text{Cl}$ . **Hint:** The successive formation constants of the nickel amines are:  $K_1 = 10^{2.75}$ ,  $K_2 = 10^{2.20}$ ,  $K_3 = 10^{1.69}$ ,  $K_4 = 10^{1.15}$ ,  $K_5 = 10^{0.71}$ ,  $K_6 = 10^{-0.01}$ .

4. A 0.2054 g sample of  $\text{CaCO}_3$  (primary standard) is dissolved in hydrochloric acid and the solution is diluted with water to 250.0 mL (solution A). A 50.0 mL aliquot of solution A is titrated with 41.12 mL of EDTA solution.

a) I calculated a Molarity of 0.00998. Is this correct? (show all calculation).

b) Now a 100.0 mL sample of water containing  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  is titrated with 22.74 mL of the EDTA solution in the example above at  $\text{pH} = 10.00$ . Another 100 mL sample is treated with NaOH to precipitate  $\text{Mg}(\text{OH})_2$ , and then titrated at  $\text{pH} 13$  with 15.86 mL of the same EDTA solution. Calculate the ppm of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  in the sample.

5. A solution of 0.00599 M EDTA is used to titrate 250 mL of a solution formed by adding  $\text{MgSO}_4$  to water. The volume of EDTA solution required to reach the endpoint was 10.10 mL.

a. Write the titration reaction.

b. What was the concentration of  $\text{MgSO}_4$  in the solution?