Lesson 11: Molarity, Titrations and Dilutions

text: 159-169

what to know:
- concept of molarity and how to use it, §4-5
- how to prepare and dilute standard solutions, §4-5
- stoichiometry of reactions of aqueous solutions, §4-5
- concept of titrations and related terms, §4-5

questions:
1. How many g of NaOH(40) are required to prepare 500 mL of 0.250 M solution?

2. How many grams of solute are in 35.0 mL of 0.125 M NaCl(58.5)?

3. If I dissolve 684 g of sugar(342 g/mole) in 1.00 L of water, would I have a 2.0 M solution? Explain your answer.

4. What volume of 0.90 M H$_2$SO$_4$ solution can be prepared from 10.0 g of sulfuric acid and all the water you need?

5. How many mL of a 0.550 M HCl solution are required to prepare 1.00 L of 0.200 M HCl by dilution?

6. How many mL of 0.120 M NaOH would be required to prepare 250 mL of a 0.030 M solution by dilution?

7. Assuming that volumes are additive, what is the molarity of sodium ion and chloride ion in a solution prepared by mixing:
   a. 100 mL of 0.20 M NaCl with 200 mL of 0.10 M HCl?
   b. 100 mL of 0.20 M NaCl with 50.0 mL of 0.40 M AgNO$_3$? (AgCl precipitates)
   c. 100 mL of 0.20 M Na$_2$SO$_4$ with 100 mL of 0.20 M BaCl$_2$? (BaSO$_4$ precipitates)

8. What is the molarity of a HCl solution if excess AgNO$_3$ is added to 250 mL of the HCl solution and the resulting dry AgCl(143.5) weighs 1.435 g?

9. What volume of 0.105 M Ba(OH)$_2$ is required to exactly neutralize 25.0 mL of 0.315 M HNO$_3$?

10. What volume of 0.20 M NaOH would react with 100 mL of 0.30 M H$_2$SO$_4$?

11. An acidic solution of potassium permanganate reacts with oxalate ions, C$_2$O$_4^{2-}$, to form carbon dioxide and manganese (II) ions. If 38.4 mL of 0.150 M potassium permanganate is required to titrate 25.2 mL of sodium oxalate solution, what is the molarity of the oxalate ion? It requires 2 permanganate ions to oxidize 5 oxalate ions.

12. Excess sodium sulfate is added to a 50.0 mL of a Ba(OH)$_2$ solution and the resulting BaSO$_4$ (233 g/mole) weighs 2.963 g. What is the molarity of the barium hydroxide solution.