

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 H₂SO₄ 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 AgNO₃? (AgCl precipitates)
 - c. 100 mL of 0.20 M Na₂SO₄ with 100 mL of 0.20 M BaCl₂? (BaSO₄ precipitates)
8. What is the molarity of a HCl solution if excess AgNO₃ 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 HNO₃?
10. What volume of 0.20 M NaOH would react with 100 mL of 0.30 M H₂SO₄?
11. An acidic solution of potassium permanganate reacts with oxalate ions, C₂O₄²⁻, 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 BaSO₄ (233 g/mole) weighs 2.963 g. What is the molarity of the barium hydroxide solution.