Solutions

Molarity

Mole solute/liters solution

The molar concentration of a solution, expressed as the number of moles of solute per liter of solution.

Homework & reading

- Chapter 18
- section 18.2 Questions 8-13

Problems

- sample molarity problems

Molarity problems

- Find the molarity:
- 25.0 grams of NaCl mixed with water to make 2.50 liters of solution
- Find the grams needed to make a 5.0 liter of 0.10 M solution of $CaCl_2$

- 0.17 M

55 g $CaCl_2$

NaCl

- $\frac{25.0\text{ g NaCl}}{1} \times \frac{1\text{ mole NaCl}}{58.4\text{ g NaCl}} = 0.428\text{ mol}$

$$\frac{0.428\text{ mol}}{2.5\text{ L}}$$

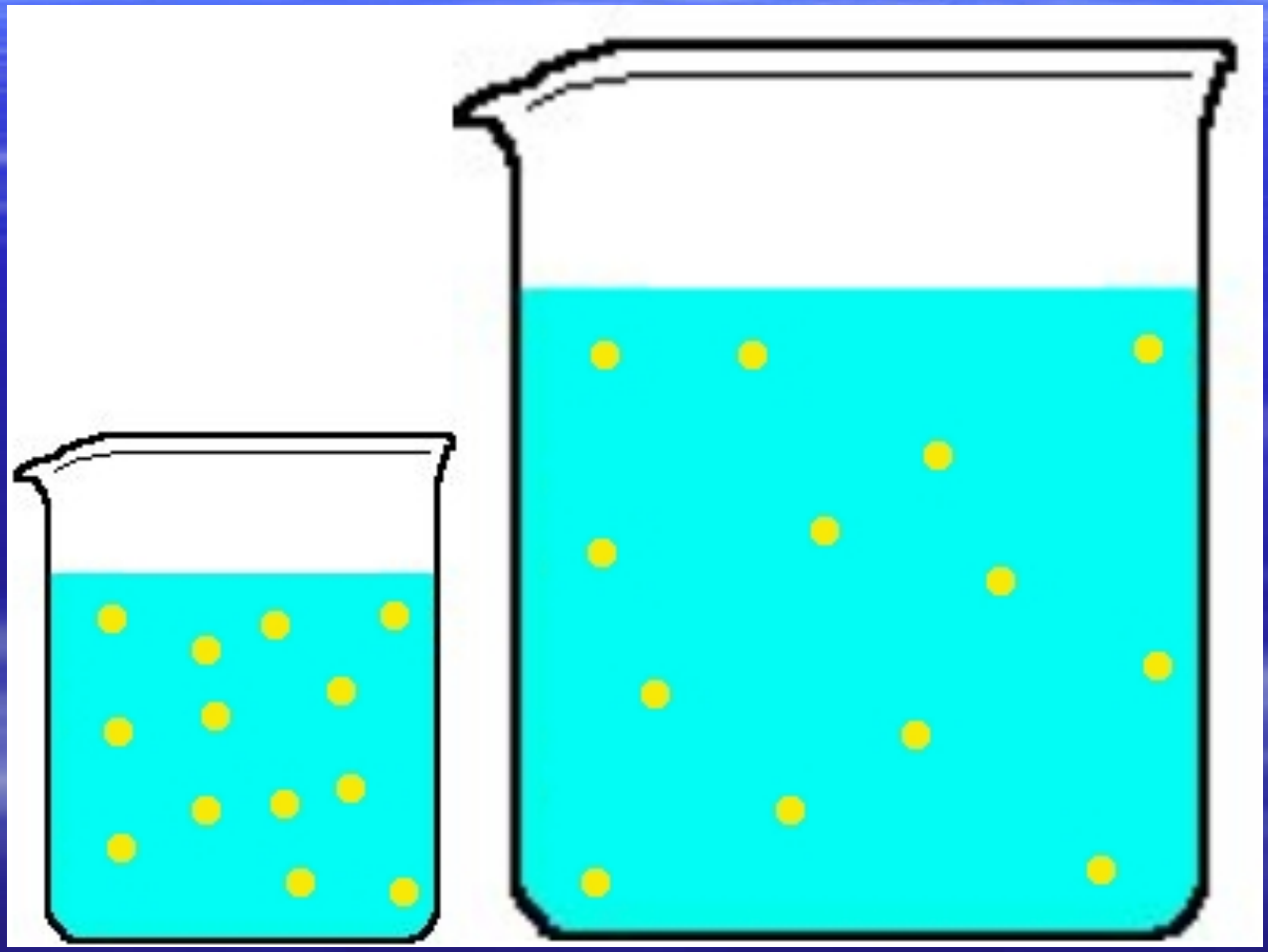
Molarity problems

- What volume of 3.0 M KOH is needed to have 1.5 moles of KOH?
- 0.50 L

Solution Dilution

- Often chemists need to dilute a stock solution (like concentrated acids)
- Once the required number of moles is known dilution is easy

Dilution spreads out the solute particles



Homogeneous and shades

Dilutions

- $Molarity_{stock} \times Volume_{stock} = Molarity_{dilute} \times Volume_{dilute}$
- $M_s \times V_s = M_d \times V_d$

  OR
- $M_1 \times V_1 = M_2 \times V_2$

EXAMPLE PROBLEM

- Given a stock solution of 12 M HCl mix the following: A chemistry teacher needs 1750 mL of 0.1 M HCl solution. What volume of the stock HCl is required?
- M_s = 12 M
- V_s = X
- V_d = 1750 mL
- M_d = 0.1 M
- Solve for V_s

$$V_s = \frac{M_d \times V_d}{M_s}$$

$$V_s = \frac{0.1\ M \times 1.750\ L}{12\ M}$$

$$V_s = 0.0146\ L$$