

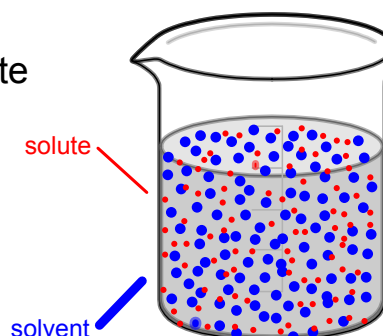
Calculating the concentration of solutions

concentration - the amount of solute dissolved in a given amount of solvent

- dilute = low concentration of solute
- concentrated = high concentration of solute

Three ways to calculate concentration:

- molarity
- percent (m/v and v/v)
- molality



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Molarity

$$\text{Molarity (M)} = \frac{\text{moles of solute (n)}}{\text{Liters of solution (V)}}$$

$$M = \frac{n}{V}$$

in some problems, you may need to convert grams to moles first

- divide by the molar mass

you may also need to convert milliliters to Liters

- divide by 1000

this also means:

$$n = M \times V$$

$$\text{moles of solute (n)} = \text{Molarity (M)} \times \text{Liters of solution (V)}$$

you can convert moles to grams by multiplying by the molar mass

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p. 511, #9

A solution has a volume of 250 mL and contains 0.70 mol NaCl. What is its molarity? $V=0.25\text{ L}$ n

$$M = \frac{n}{V} = \frac{0.70 \text{ mol NaCl}}{0.25 \text{ L}}$$

$$= 2.8 \text{ M NaCl}$$

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p. 511, #11

How many moles of solute are in 250 mL of 2.0M CaCl₂? How many grams of CaCl₂ is this? V M

$$M = \frac{n}{V}$$

$$n = M \times V = (2.0 \frac{\text{mol}}{\text{L}} \text{ CaCl}_2) (0.25 \text{ L})$$

$$= 0.5 \text{ mol CaCl}_2$$

$$\frac{0.5 \text{ mol CaCl}_2}{1 \text{ mol}} \times 110.984 \text{ g CaCl}_2 = 55.5 \text{ g}$$

$$= 56 \text{ g CaCl}_2$$

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p. 510, Sample Problem 18-2

→ convert to n ✓

A saline solution contains 0.90 g NaCl in exactly 100 mL of solution. What is the molarity of the solution?

$$M = \frac{n}{V} = \frac{0.016 \text{ mol}}{0.1 \text{ L}} = \boxed{0.16 \text{ M NaCl}}$$

$$n = \frac{0.90 \text{ g NaCl}}{55.44 \text{ g NaCl}} \times 1 \text{ mol NaCl} =$$

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