

Quantitative Chemistry

Concept of concentration of solutions

- Concentration = mass / volume
- Mass = concentration x volume
- Volume = mass / conc.
- **Standard solution:**
A soln. of accurately known conc.

Problem 1: What is conc. of a salt soln. if you dissolve 10 g of NaCl in 250 cubic cm of water?

$$\begin{aligned} 250 \text{ cubic cm} &= 250 / 1000 \text{ cubic dm} \\ &= 0.25 \text{ cubic dm} \end{aligned}$$

$$\mathbf{c = m / v}$$

$$\mathbf{c = 10 / 0.25 = 40 \text{ g / cubic dm or 40 g / L}}$$

Problem 2: What mass of salt is required to make 200 cubic cm of conc 15 g / cubic dm?

$$\mathbf{c = m / v}$$

$$15 \text{ g / cubic dm} = \text{mass} / 200 \text{ cubic cm}$$

$$200 \text{ cubic cm} = 200 / 1000 \text{ cubic dm}$$

$$\text{Mass} = 15 \times 0.2$$

$$= 3 \text{ g}$$

Problem 3: If you were given 8 g of salt, what volume of water, in cubic dm and cubic cm, should you dissolve to give a salt soln. of conc. of 5 g / cubic dm?

$$\mathbf{v = m / c}$$

$$\mathbf{v = 1.6 \times 1000}$$

$$\mathbf{v = 1600 \text{ cubic cm}}$$

What is Molarity?

Molarity = moles of solute / liters of soln.
= grams of solute / molar mass of solute x liters of soln.

Problem 1: Calculate number of moles in 63.2 g of chloride molecule.

$$\begin{aligned}n &= m / M \\&= 63.2 \text{ g} / 70 \text{ g} \\&= 0.903 \text{ mol of chloride molecule}\end{aligned}$$

Problem 2: What is molarity of a soln. containing 0.32 moles of NaCl in 3.4 liters?

$M = \text{moles of solute} / \text{liters of soln.}$

$$= 0.32 / 3.4$$

$$= 0.094 \text{ M NaCl}$$