

Concentration

% (w/v) or %

% (w/v): Weight to Volume Percentage
sometimes just written as %

assume solvent is water so $1 \text{ g}_{\text{H}_2\text{O}} \approx 1 \text{ mL}_{\text{H}_2\text{O}}$

$$X \% = \frac{X \text{ g}}{100 \text{ g}_{\text{H}_2\text{O}}} = \frac{X \text{ g}}{100 \text{ mL}_{\text{H}_2\text{O}}} = X \% (\text{w/v})$$

example: prepare 500 mL of a 7% NaCl solution.

$$C = \frac{m_{\text{NaCl}}}{V_{\text{total}}}$$

$$\frac{7 \text{ g}_{\text{NaCl}}}{100 \text{ mL}} = \frac{m_{\text{NaCl}}}{500 \text{ mL}}$$

$$m_{\text{NaCl}} = 500 \text{ mL} \left(\frac{7 \text{ g}}{100 \text{ mL}} \right) = 35 \text{ g}_{\text{NaCl}}$$

example: prepare 20 g_{NaCl} of a 8% NaCl solution.

$$C = \frac{m_{\text{NaCl}}}{V_{\text{total}}}$$

$$\frac{8 \text{ g}_{\text{NaCl}}}{100 \text{ mL}} = \frac{20 \text{ g}_{\text{NaCl}}}{V_{\text{total}}}$$

$$V_{\text{total}} = \frac{(100 \text{ mL})(20 \text{ g}_{\text{NaCl}})}{8 \text{ g}_{\text{NaCl}}} = 250 \text{ mL}$$

Concentration % (w/w)

% (w/w): percentage weight to weight

example: prepare a 850 g solution of
a 7.2 % (w/w) of NaCl

$$C = \frac{m_{\text{NaCl}}}{m_{\text{total}}}$$

$$\frac{7.2 \text{ g}_{\text{NaCl}}}{100 \text{ g}} = \frac{m_{\text{NaCl}}}{850 \text{ g}}$$

$$m_{\text{NaCl}} = \frac{(850 \cancel{\text{ g}})(7.2 \text{ g}_{\text{NaCl}})}{100 \cancel{\text{ g}}} = \boxed{61.2 \text{ g}_{\text{NaCl}}}$$

example: prepare a 8.4 % (w/w) solution given
12 g of NaCl.

$$C = \frac{m_{\text{NaCl}}}{m_{\text{total}}}$$

$$\frac{8.4 \text{ g}_{\text{NaCl}}}{100 \text{ g}} = \frac{12 \text{ g}_{\text{NaCl}}}{m_{\text{total}}}$$

$$m_{\text{total}} = \frac{(100 \text{ g})(12 \cancel{\text{ g}_{\text{NaCl}}})}{8.4 \cancel{\text{ g}_{\text{NaCl}}}} = \boxed{142.9 \text{ g}}$$

Concentration

% (v/v)

% (v/v):

percentage volume to volume

example: prepare 800 mL of a 9% (v/v) of ethanal

$$C = \frac{V_{\text{eth}}}{V_{\text{total}}}$$

$$\frac{9 \text{ mL eth}}{100 \text{ mL}} = \frac{V_{\text{eth}}}{800 \text{ mL}}$$

$$V_{\text{eth}} = \left(\cancel{800 \text{ mL}} \right) \left(\frac{9 \text{ mL eth}}{\cancel{100 \text{ mL}}} \right) = \boxed{72 \text{ mL eth}}$$

example: prepare a 6.4% (v/v) solution given 40 mL of ethanal

$$C = \frac{V_{\text{eth}}}{V_{\text{total}}}$$

$$\frac{6.4 \text{ mL eth}}{100 \text{ mL}} = \frac{40 \text{ mL eth}}{V_{\text{total}}}$$

$$V_{\text{total}} = \frac{(100 \text{ mL})(\cancel{40 \text{ mL eth}})}{6.4 \cancel{\text{ mL eth}}} = \boxed{625 \text{ mL}}$$