Did you do the homework?

When you stay up late to finish school work:
What is concentration?

The amount of substance within a given volume

\[ C = \frac{M}{V} \]

C: concentration (g/L)
m: mass of solute (grams)
V: volume of solution (litres)

Remember: 1 L = 1000 ml
What is percentage?

“per 100”
What percentage of the squares are grey?

Grey squares = 20
Total squares = 100
Percentage = 20%
Percent (m/V)

- We can also measure concentration in % (m/V)

\[
C = \frac{m}{V} \\
= \frac{\text{grams of solute}}{100\text{ml of solution}} \times 100\% 
\]
What is the % concentration?

\[ C = \frac{m}{V} = \frac{2g}{25ml} \]

\[ \frac{2g}{25ml} = \frac{xg}{100ml} \]

8%
Situation
1. What is the % concentration of sugar in a 355ml can of Coca-Cola?

\[ C = \frac{m}{V} = \frac{42g}{355ml} \]

\[ \frac{42g}{355ml} = \frac{11.83\%}{100ml} \]

\[ 11.83\% \]
Practice Problem

2. What is the % concentration of sugar in a 591ml bottle of Gatorade?

\[ C = \frac{m}{V} = \frac{35\text{ g}}{591\text{ ml}} \]

\[ \frac{35\text{ g}}{591\text{ ml}} = \frac{x\text{ g}}{100\text{ ml}} \]

5.92%
Rearranging the Equations
Rearranging the Equation to solve for Mass

\[ C = \frac{m}{V} \]

\[ m = CV \]
Example

Gabrielle wants to make 125ml of a 8g/L saline solution. How much salt will she need to use?

\[
C = \frac{8\text{g}}{L} \\
m = ? \\
V = 125\text{ml} \\
= 0.125\text{L} \\
m = CV \\
= \frac{8\text{g}}{L} \times 0.125\text{L} \\
m = 1\text{g}
\]
Rearranging the Equation to solve for Volume

\[ C = \frac{m}{V} \]

\[ V = \frac{m}{C} \]
Example

What is the maximum volume that Marcus can make of an 8% solution of chocolate milk if he uses 24g of Nesquik powder?

\[ C = 8\% \]
\[ m = 24g \]
\[ V = ? \]

\[ V = \frac{m}{C} \]

\[ V = \frac{24g}{8g/100ml} = \frac{24g}{8g} \times \frac{100ml}{8g} \]

\[ V = 300ml \]
Example

What is the maximum volume that Marcus can make of an 8% solution of chocolate milk if he uses 24g of Nesquik powder?

\[ C = \frac{8g}{100ml} \]

\[ m = 24g \]

\[ V = ? \]

\[ C = \frac{8g}{100ml} \]

\[ \frac{8g}{100ml} = \frac{24g}{Xml} \]

\[ V = 300ml \]
Drink too sweet! What do you do?
What is Dilution?

Reducing the concentration of a solution by the addition of solvent
1 g of solute in 1 L of water
C = 1g/L

3 L of water

1 g of solute in 4 L of water
C = 0.25g/L

What’s happening to:
- Solute?
- Solvent?
- Concentration?
Dilution

• When you are diluting a substance the amount of solute remains the same.

• The volume of solvent increases.

• Therefore the concentration decreases.
Formula

\[ C_1 V_1 = C_2 V_2 \]

Remember: mass remains the same!
Practice Problem

Izaah had 50ml of 20g/L solution of Kool-Aid. She found it to be too sweet so she added another 50ml of water. What is the final concentration (g/L)?

\[ V_1 = 50\text{ml} = 0.05\text{L} \]
\[ C_1 = 20\text{g/L} \]

\[ V_2 = 50\text{ml} + 50\text{ml} = 100\text{ml} = 0.1\text{L} \]
\[ C_2 = ? \]

\[ C_1V_1 = C_2V_2 \]
\[ (20\text{g/L})(0.05\text{L}) = C_2(0.1\text{L}) \]

\[ C_2 = \frac{1\text{g/L}}{0.1} = 10\text{g/L} \]
Worksheets

Work on worksheets:
- Solutions III
- Solutions IV
- Solutions V
- Solutions VI