PREPARING SOLUTIONS AND REAGENTS

Chemical Solutions (aqueous = water is the solvent)

Types of vessels (least to most precise):

- Beaker
- Erlennmeyer flask
- Graduated cylinder

DEFINITIONS:

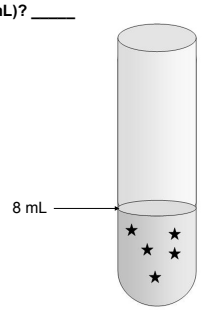
- **SOLUTES** -- substances that are dissolved (Miracle Grow)
- **SOLVENTS** -- substance in which solutes are dissolved (water)
- **CONCENTRATION** -- the amount of solute divided by the amount of solvent. How much Miracle Grow is in the water?

*How strong is the Kool-Aid?

Facts of Life

- Mass is measured in Grams, mg, µg
  1g = 1000mg = 1,000,000µg
- Volume is measured in liters, mL, µL
  1L = 1000mL = 1,000,000 µL
- Density of water is 1 g / mL
- Concentration is expressed in many ways:
  - 1. percent
  - 2. mg/ mL
  - 3. molar
  - 4. "X" solution

Each star represents 1 mg of NaCl.
What is the total amount of NaCl in the tube? _____
What is the concentration of NaCl in the tube (in mg/ mL)? _____



$\frac{5\text{ mg}}{8\text{ mL}} = \frac{?}{1\text{ mL}}$

? = 0.63 mg, so the concentration is *0.63 mg/mL*

Percent Solutions

- Per means "for every one"
- Cent means 100
- Example: a 5% miracle grow solution has 5 grams of solute for 100g of solution

$\frac{5\text{g}}{100\text{mL}}$ 100 g of water = 100 mL
The solution is mostly water

Germination Lab:

Make 100 mL of a 5% Miracle Grow solution

5 g / 100 g = 5 g / 100 mL
because the density of water is 1 g / mL

Use 5 g of Miracle Grow and bring to a volume of (BTV) 100 mL with water

Diluting Solutions

Formula:

$C_1V_1 = C_2V_2$

Concentration $_1$ x Volume $_1$
=
Concentration $_2$ x Volume $_2$

Germination Lab: 3.75% solution

- Solution 1 is 5% Miracle Grow (stock solution)
- Solution 2 is 3.75% Miracle Grow (what you want)

- How do you make 10 mL of 3.75% Miracle Grow solution?

- $C_1 V_1 = C_2 V_2$
- (5%) (?) = (3.75%) (10 mL)
- ? = 7.5mL of Solution 1

- How much water do you use to make 10mL?
- Add 2.5mL water to 7.5mL 5% stock solution!

Germination Lab: 2.5% solution

- Solution 1 is 5% Miracle Grow (stock solution)
- Solution 2 is 2.5% Miracle Grow (what you want)

- How do you make 10 mL of 2.5% Miracle Grow solution?

- $C_1 V_1 = C_2 V_2$
- (5%) (?) = (2.5%) (10 mL)
- ? = 5mL of Solution 1

- How much water do you use to make 10mL?
- Add 5mL water to 5mL 5% stock solution!

Germination Lab: 1.25% solution

- Solution 1 is 5% Miracle Grow (stock solution)
- Solution 2 is 1.25% Miracle Grow (what you want)

- How do you make 10 mL of 1.25% Miracle Grow solution?

- $C_1 V_1 = C_2 V_2$
- (5%) (?) = (1.25%) (10 mL)
- ? = 2.5mL of Solution 1

- How much water do you use to make 10mL?
- Add 7.5mL water to 2.5mL 5% stock solution!