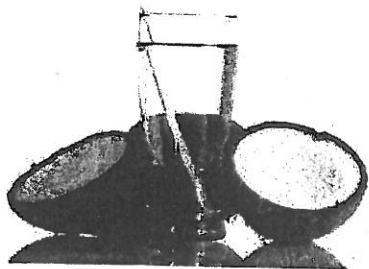


Name: _____

Review of Concentration and Dilution



ANS
key

You have been tele-ported back in time to the Vietnam War where you are posted as a medic. Your job is to **prepare coconut water solutions** which will be used for blood transfusions for injured soldiers. You must prepare the proper amounts and concentrations for each patient. Using your knowledge of concentration of solutions, calculate the following:

1. You mix ^{solute} 36 mL of coconut juice with ^{solvent} 172 mL of distilled water. What is the percent concentration of coconut in the solution?

$$\begin{aligned} \%C(v/v) &= \frac{v \text{ of solute}}{v \text{ of solution}} \times 100\% \\ &= \frac{36 \text{ mL}}{208 \text{ mL}} \times 100\% \\ &= \boxed{17.3\%} \end{aligned}$$

2. You have a 200 mL solution of 27% coconut juice.

a) What is the amount of coconut juice in the solution?

$$\circ \%C(v/v) = \frac{v \text{ of solute}}{v \text{ of solution}} \times 100\%$$

$$\circ \frac{27 \text{ mL}}{100 \text{ mL}} \times \frac{100\%}{100\%} = \frac{X}{200 \text{ mL}} \times \frac{100\%}{100\%}$$

$$\circ 27\% = \frac{X}{200 \text{ mL}} \times 100\%$$

$$\circ \frac{27 \text{ mL}}{100 \text{ mL}} = \frac{X}{200 \text{ mL}}$$

b) What is the amount of water in the solution?

$$\circ X = \frac{200 \text{ mL} \times 27 \text{ mL}}{100 \text{ mL}}$$

$$\text{Solution} = \text{solute} + \text{solvent}$$

$$200 \text{ mL} = 54 \text{ mL} + X$$

$$X = 200 \text{ mL} - 54 \text{ mL}$$

$$\boxed{X = 146 \text{ mL}}$$

$$X = 54 \text{ mL}$$

3. What is the mass of coconut in a solution that has a concentration of 37 g/L and a volume of 600 mL?

$$C = \frac{m}{V}$$

$$m = C \times V$$

$$m = 37 \text{ g/L} \times 0.6 \text{ L}$$

$$m = \boxed{22.2 \text{ g}}$$

4. What is the volume of the coconut solution that is 23 g/L and the mass of coconut is 13 g?

$$C = \frac{m}{V}$$

$$V = \frac{m}{C}$$

$$V = \frac{13 \text{ g}}{23 \text{ g/L}}$$

$$V = \boxed{0.57 \text{ L}}$$

5. What is the concentration of the coconut solution if the mass of coconut is 18 g and the solution has a volume of 120 mL?

$$\rightarrow 0.12 \text{ L}$$

$$C = \frac{m}{V}$$

$$C = \frac{18 \text{ g}}{0.12 \text{ L}}$$

$$C = \boxed{150 \text{ g/L}}$$

6. Arrange the following solutions in order from weakest to strongest coconut solution.

a) 50 g in 700 mL

$$C = \frac{m}{V} = \frac{50 \text{ g}}{700 \text{ mL}} = 0.07 \text{ g/L}$$

b) 0.2 kg in 1000 mL

$\rightarrow 200 \text{ g}$

$$C = \frac{m}{V} = \frac{200 \text{ g}}{1000 \text{ mL}} = 0.2 \text{ g/L}$$

c) 300 g in 2 L

$\rightarrow 2000 \text{ mL}$

$$C = \frac{m}{V} = \frac{300 \text{ g}}{2000 \text{ mL}} = 0.15 \text{ g/L}$$

ANS $\boxed{A, C, B}$

7. You are required to dilute a solution of 100 mL which is 40 g/L in order to prepare a 300 mL solution. What is the concentration of the final solution?

$$\frac{C_1}{C_2} = \frac{V_2}{V_1}$$

$$40 \text{ g/L} = \frac{300 \text{ mL}}{100 \text{ mL}} \cdot C_2$$

$$C_2 = \frac{100 \text{ mL} \times 40 \text{ g/L}}{300 \text{ mL}}$$

$$C_2 = 13.33 \text{ g/L}$$

8. You are required to prepare a 14% coconut solution with a volume of 200 mL. You begin with a solution that has a concentration of 30%.

a) What is the initial volume?

$$\frac{C_1}{C_2} = \frac{V_2}{V_1}$$

$$\frac{30\%}{14\%} = \frac{200 \text{ mL}}{V_1}$$

$$V_1 = \frac{14\% \times 200 \text{ mL}}{30\%}$$

$$V_1 = 93.3 \text{ mL}$$

b) How much water did you add?

$$V_2 - V_1 = \text{water added}$$

$$200 \text{ mL} - 93.3 \text{ mL} = 106.7 \text{ mL}$$

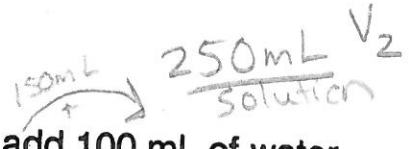
9. You have a 150 mL solution that is 15% coconut you add 100 mL of water. What is the concentration of the final solution?

$$\frac{C_1}{C_2} = \frac{V_2}{V_1}$$

$$\frac{15\%}{C_2} = \frac{250 \text{ mL}}{150 \text{ mL}}$$

$$C_2 = \frac{15\% \times 150 \text{ mL}}{250 \text{ mL}}$$

$$C_2 = 9\%$$



Concentration and Dilution Worksheet

$$\frac{0.5g}{100mL} = \frac{0.5g}{0.1L} = 5g/L \quad \frac{2g}{100mL} = \frac{2}{0.1L} = 20g/L$$

1) Arrange the following in order from most to least concentrated:

i) a) 8 g/L b) 0.5% c) 2% d) 12 g/L ANS: c, d, a, b

ii) a) 10% b) 73 g/L c) 0.5 kg/L d) 6% → $\frac{6g}{100mL} = \frac{6g}{0.1L} = 60 \frac{g}{L}$ ANS: c, a, b, d

$$\frac{10g}{100mL} = \frac{10g}{0.1L} = 100g/L$$

2) a) Calculate the quantity of solute used in the creation of a 1.2 g/L solution that has a volume of 5 L.

$$C = \frac{m}{V} \quad m = C \times V$$

$$m = 1.2g/L \times 5L = \boxed{6g}$$

b) Calculate the volume of a solution where the concentration is 13 g/L and the amount of solute used is 7 g

$$C = \frac{m}{V} \quad V = \frac{m}{C} = \frac{7g}{13g/L} = \boxed{0.54L}$$

3) a) What mass percent concentration is a 250 mL solution that has 12 g of solute dissolved? $\%C(m/v) = \frac{m \text{ of solute}}{V \text{ of solution}} \times 100\% = \frac{12g}{250mL} \times 100\% = \boxed{4.8\% (g/mL)}$

b) What amount of solute is used to create a 150 mL with volume percent concentration of 4%?

$$\%C(v/v) = \frac{V \text{ of solute}}{V \text{ of solution}} \times 100\%$$

$$4\% = \frac{x}{150mL} \times 100\%$$

$$\frac{4mL}{100mL} \times 100\% = \frac{x}{150mL} \times 100\%$$

$$x = \frac{150mL \times 4}{100} = \boxed{6mL}$$

4) If I have 340 mL of a 0.5 g/L NaBr solution, what will the concentration be if I add 560 mL more water to it?

$$\frac{C_1}{C_2} = \frac{V_2}{V_1} \quad \frac{0.5g/L}{C_2} = \frac{900mL}{340mL}$$

$$C_2 = \frac{340mL \times 0.5g/L}{900mL} = \boxed{0.19g/L}$$

5) If I dilute 250 mL of 0.10 g/L lithium acetate solution to a volume of 750 mL, what will the concentration of this solution be?

$$\frac{C_1}{C_2} = \frac{V_2}{V_1} \quad \frac{0.10g/L}{C_2} = \frac{750mL}{250mL}$$

$$C_2 = \frac{250mL \times 0.10g/L}{750mL} = \boxed{0.03g/L}$$

6) a) A 250 mL solution with a concentration of 13% was diluted to a concentration of 5%, what is the new volume of the solution?

$$\frac{C_1}{C_2} = \frac{V_2}{V_1} \quad \frac{13\%}{5\%} = \frac{V_2}{250mL}$$

$$V_2 = \frac{250mL \times 13\%}{5\%} = \boxed{650mL}$$

b) What volume of water was added to the original solution?

$$650mL - 250mL = \boxed{400mL}$$