

Name: Answer

Date: _____

Practice Stencil: Concentration of Solutions

1. Solute or solvent?

- a) The substance present in smaller quantities in a solution solute
- b) The substance present in larger quantities in a solution solvent
- c) Substance which dissolves another substance solvent
- d) The substance that dissolves solute

2. What is solubility? What unit do we use to measure solubility?
Name two factors that can change the solubility of a substance.

- Ability of a substance to dissolve in another substance
- g/L, g/mL, %, g/100mL
- temp., nature, agitation

3. Determine the concentration in g/L (m/V) and in g/100mL (%m/V) of each of the following solutions.

	Concentration	
	g/L	g/100 mL
A. 3.5g of NaOH in 80 mL of solution.	43.75g/L	4.375g/100mL
B. 250 mL of solution at 6 %m/V	150g/L	6g/100mL
C. 33g of NaCl in 6 L of solution	5.5g/L	0.55g/100mL
D. 0.9 kg of solute in 3L of solution	300g/L	30g/100mL

4. Observe the following diagram.



- a) Which have the same concentration? A & D
- b) What is the concentration of these two solutions? 3g/L

5. Jeremy wants to prepare a 150 mL of iced tea with a concentration of 30 g/L using commercial iced tea powder in a pouch.
How should he proceed? Make the necessary calculations and write up a procedure.

$$\frac{150 \text{ mL}}{1000} = 0.15 \text{ L}$$

$$\frac{30 \text{ g}}{1 \text{ L}} = \frac{x \text{ g}}{0.15 \text{ L}}$$

$$x = 4.5 \text{ g}$$

(cross multiply & ÷)

- ① Weigh 4.5g of ice tea powder
- ② Fill glass with 150mL of water
- ③ add powder
- ④ Stir to dissolve

6. The following equation is used for diluting certain solutions:

$$C_1V_1 = C_2V_2$$

What does each of these variables mean?

Variable	Meaning of variable
C_1	Initial Concentration (\uparrow)
V_1	Initial Volume (\downarrow)
C_2	Final Concentration (\downarrow)
V_2	Final Volume (\uparrow)

7. How will the concentration of a solution change if it is diluted six times its volume of water?

- a) It will be six times bigger
- b) It will be six times smaller
- c) It will be seven times smaller
- d) It will not change

8. We add 80 mL of water to a 20 mL solution which has a concentration of 40 g/L. What is the concentration of the new solution?

$$C_1 = 40 \text{ g/L} \quad C_2 = ?$$

$$V_1 = 20 \text{ mL} \quad V_2 = 20 \text{ mL} + 80 \text{ mL} = 100 \text{ mL}$$

$$(0.02 \text{ L}) \quad (0.1 \text{ L})$$

$$C_1 V_1 = C_2 V_2$$

$$(40)(0.02) = (x)(0.1)$$

$$x = 8 \text{ g/L}$$

9. We want to prepare 300 mL of saltwater solution with a concentration of 5 g/L. What initial volume of solution do we need to dilute if the initial concentration of 30 g/L?

$$C_1 = 30 \text{ g/L} \quad C_2 = 5 \text{ g/L}$$

$$V_1 = x \quad V_2 = 300 \text{ mL} (0.3 \text{ L})$$

$$C_1 V_1 = C_2 V_2$$

$$(30 \text{ g/L})x = (5 \text{ g/L})(0.3 \text{ L})$$

$$x = 0.05 \text{ L} \text{ or } 50 \text{ mL}$$

10. We obtained a 200 mL solution with a concentration of 4 g/L by adding 150 mL of water to the initial concentration. What was the initial concentration?

$$C_1 = x \quad C_2 = 4 \text{ g/L}$$

$$V_1 = (200 - 150) \text{ mL} = 50 \text{ mL} (0.05 \text{ L})$$

$$V_2 = 200 \text{ mL} (0.2 \text{ L})$$

$$C_1 V_1 = C_2 V_2$$

$$x(0.05) = (4)(0.2)$$

$$x = 16 \text{ g/L}$$

11. A 2.5 liter milk carton is labeled at 3.25% M.F. How much fat is there in the milk carton? How much fat is there in 100 mL serving?

$$3.25\% = \frac{3.25 \text{ g}}{100 \text{ mL}}$$

$$\frac{3.25 \text{ g}}{100 \text{ mL}} = \frac{x \text{ g}}{2500 \text{ mL}}$$

$$\frac{32.5}{2500} = \frac{x}{100}$$

$$= 1.3 \text{ g} / 100 \text{ mL}$$

$$x = 32.5 \text{ g of fat in } 2.5 \text{ L of milk}$$

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Concentrations Review

1) Determine the concentrations of the following solutions in g/L.

a) 30g of solute in 2.5L of a solution

b) 14g of solute in 250mL of a solution

$$C = \frac{m}{V} = \frac{30g}{2.5L} = 12g/L$$

Answer:

$$12g/L$$

$$C = \frac{m}{V} = \frac{14g}{0.25L}$$

$$250 \div 1000 = 0.25$$

Answer:

$$56g/L$$

2) Determine the concentration of the following solutions in % m/V.

a) 1.5g of solute in 60mL of a solution

b) 90g of solute in 1.5L of a solution

$$\frac{1.5g}{60} \times 100$$

Answer:

$$2.5\%$$

$$\frac{90g}{1500} \times 100$$

Answer:

$$6\%$$

3) Calculate the mass of the solute that is needed to obtain the following solutions.

500mL with a concentration of 75g/L

b) 35mL with a concentration of 50g/L

$$\frac{75g}{1L} = \frac{xg}{.5L}$$

Answer:

$$37.5g$$

$$\frac{50g}{1L} = \frac{xg}{0.035L}$$

Answer:

$$1.75g$$

4) Convert the following concentrations:

a) 27g/L into a percent

b) 18% m/V into g/L

$$\frac{27g}{1000mL} \times 100$$

$$2.7\%$$

$$\frac{18g}{100mL} = \frac{xg}{1000mL}$$

$$180g/L$$

- 5) Samantha dissolves 15g of sugar in 50mL of water. What is the concentration of this solution? If she needs to prepare a solution of 500 ml, what mass of sugar would she need to dissolve to obtain the same concentration?

$$\frac{15\text{g}}{0.05\text{L}} = 300\text{g/L} \quad \frac{300\text{g}}{1000\text{mL}} = \frac{x\text{g}}{500\text{mL}} \quad x = 150\text{g}$$

- 6) Among the following solutions, which ones have the same concentration?

- Solution 1: 9g of solute in a 2L solution $\frac{9}{2} = 4.5\text{g/L}$
- Solution 2: 3g of solute in a 250mL solution $3/0.25 = 12\text{g/L}$
- Solution 3: 4g of solute in a 0.5L solution $4/0.5 = 8\text{g/L}$
- Solution 4: 12g of solute in a 1.5L solution $12/1.5 = 8\text{g/L}$

- a) 2 and 3 **b) 3 and 4** c) 1 and 4 d) 1 and 2

- 7) Among the following concentrations, which one has the highest concentration?

- a) 60g of solute in a 6L solution $60 \div 6 = 10\text{g/L}$
b) 1.5g of solute in a 0.1L solution $1.5/0.1 = 15\text{g/L}$
 c) 3g of solute in a 0.25L solution $3/0.25 = 12\text{g/L}$
 d) 30g of solute in a 7.5L solution $30/7.5 = 4\text{g/L}$

- 8) Annie, Mike and Julie prepared some Iced Tea. Annie dissolved 60g of Iced Tea powder in 2.5L of water. Mike used 75g of powder to prepare 3L of Iced Tea. Julie prepared 300mL of Iced Tea, using 9g of powder.

Calculate the concentration of each solution:

Annie: $\frac{60}{2.5} = 24\text{g/L}$ Mike: $\frac{75}{3} = 25\text{g/L}$ Julie: $\frac{9}{0.3} = 30\text{g/L}$

Who prepared the most un-sweetened Iced Tea?

Annie