

Solutions Review Sheet
Quantitative Chemistry

For the problems, be sure to show your work, and use significant figures!

1. Define the following in your own words:

- | | |
|---------------|-------------------|
| a. Solution – | e. Saturated – |
| b. Solute – | f. Unsaturated – |
| c. Solvent – | g. Concentrated – |
| d. Soluble – | h. Dilute – |

2. Complete the chart below related to the compounds and their solubility in water.

Na: 0.9
Cl: 3.0
C: 2.5
H: 2.1
O: 3.5

Compound	Type of Bond (Ionic, PC, NPC)	Is it soluble in water?
NaCl Na-Cl	$\Delta EN = 0.9 - 3.0 = 2.1$ Ionic	Yes
C ₃ H ₁₈ C-H	$\Delta EN = 2.5 - 2.1 = 0.4$ NPC	No
CH ₂ O C-O	$\Delta EN = 2.5 - 3.5 = 1.0$ PC	Yes

*C-H $\Delta EN = |2.5 - 2.1| = 0.4$
* Doesn't matter b/c C-O is polar

3. Complete the table with the following equations. Know these!

Percent by Mass	Percent by Volume
Molarity	Dilution

4. Drugstores sell 3.00% hydrogen peroxide solutions. If you purchase a bottle with a mass of 250. grams, how many grams of hydrogen peroxide are in the bottle?

$$250. \text{ g sol'n} \times \frac{3.00 \text{ g H}_2\text{O}_2}{100. \text{ g sol'n}} = 7.50 \text{ g H}_2\text{O}_2$$

5. What is the molarity of a 2.00 L solution containing 0.15 moles of solute?

$$M = \frac{0.15 \text{ mol}}{2.00 \text{ L}} = 0.075 \text{ M}$$

6. How many grams of FeCl₃ are needed to make 100. mL of a 1.00 M solution?

$$100. \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1.00 \text{ mol FeCl}_3}{1 \text{ L}} \times \frac{162.2 \text{ g FeCl}_3}{1 \text{ mol FeCl}_3} = 16.2 \text{ g FeCl}_3$$

Briefly describe how you would prepare the above solution using a 100-mL volumetric flask.

1) Add 16.2 g FeCl₃ to a volumetric flask

2) Add water to dissolve it

3) Fill with water to the calibration mark

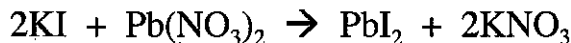
7. A stock solution contains 1.0 M silver nitrate. If you wanted to prepare 300. mL of 0.10 M silver nitrate, how many milliliters of the stock solution would you use?

$$M_c V_c = M_d V_d$$

$$(1.0 \text{ M}) V_c = (0.10 \text{ M})(300 \text{ mL})$$

$$V_c = 30. \text{ mL}$$

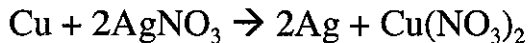
8. How many milliliters of 0.500 M KI are needed to react with 25.0 mL of 0.100 Pb(NO₃)₂?



$$25.0 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.100 \text{ mol Pb}(\text{NO}_3)_2}{1 \text{ L}} \times \frac{2 \text{ mol KI}}{1 \text{ mol Pb}(\text{NO}_3)_2} \times \frac{1 \text{ L}}{0.500 \text{ mol KI}}$$

$$\times \frac{1000 \text{ mL}}{1 \text{ L}} = 10.0 \text{ mL}$$

9. Copper reacts with silver nitrate according to the following reaction:



a. If 1.7 grams of copper are added to 100. mL of 0.10 M silver nitrate, what is the limiting reactant?

$$1.7 \text{ g Cu} \times \frac{1 \text{ mol Cu}}{63.55 \text{ g Cu}} \times \frac{2 \text{ mol Ag}}{1 \text{ mol Cu}} = 0.0535 \text{ mol Ag}$$

~~$$100. \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.10 \text{ mol AgNO}_3}{1 \text{ L}} \times \frac{2 \text{ mol Ag}}{2 \text{ mol AgNO}_3} = 0.0100 \text{ mol Ag}$$~~

AgNO₃ is the limiting reactant

b. How many grams of silver would be produced?

$$0.0100 \text{ mol Ag} \times \frac{107.9 \text{ g Ag}}{1 \text{ mol Ag}} = 1.08 \text{ g Ag}$$

should only have 2 sf