Name: Date: Pd:

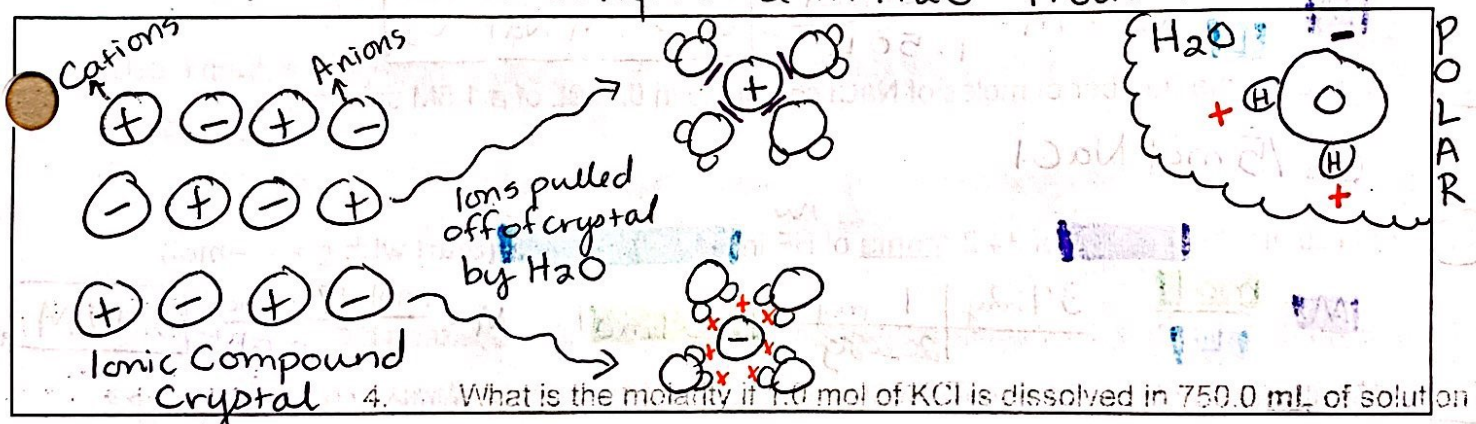
Unit 4, Section 2 - Solutions Chemistry

Solute + **Solvent** = **Solution**

Solute	Solvent	Solution
Substance being dissolved (NaCl, sugar, etc.) Solid (s) → Aqueous (aq)	Substance you are dissolving into; Usually H_2O - What you have more of	Mixture of solute + solvent - Can be (s), (l), (g)

The **ratio** of Solute to Solvent determines the concentration of the solution. Concentration is often written as brackets around the substance formula. (Ex: Concentration of Hydrochloric Acid - HCl can be written as [HCl]) Solubility, the ability of a substance to dissolve at a given set of conditions, can also be affected by changes in temp / pressure because by changing this variable, you change the space between the molecules of solvent, allowing more or less solute to be dissolved **between** them.

Dissolution: of an Ionic Compound in H_2O - Produces ions



4. What is the molarity if 1.0 mol of KCl is dissolved in 750.0 mL of solution (1L =

Types of Solutions: "Full"

Unsaturated	✱ Saturated ✱	Supersaturated
Dilute	Concentrated	—
- More solute can still dissolve in solvent	- Max amount of solute dissolved @ that temperature	- Too much solute and can't dissolve more @ that temp.
Add Solute / Remove Solvent / ↓ Temperature →		← Remove Solute / Add Solvent / ↑ Temperature

✱ RATIO ✱

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Solutions Practice:

- A solution is made from $SrCl_2$ and Water. Circle the **solute**. Draw a box around the **solvent**.
- If you were to take an **unsaturated solution** and add **more solute**, what would happen to the solute? Dissolve, become saturated

Molarity:

Molarity is a measurement of the moles of solute per liter of solution.

$$\text{molarity, M (concentration)} = \frac{\text{moles of solute}}{\text{liters of solution}}$$

* The higher the M, the more concentrated it is! 1M < 2M

The unit for molarity is a capital M and is usually read as "molar". Therefore, a solution with a label that states "2.0M" may be called a "2.0 Molar" solution.

Practice: *Show all work and round answers to the correct number of sig figs (or 2 decimal places)!*

1. Calculate the molarity of 0.060 moles $NaHCO_3$ in 1.50 L of solution.

$M = \frac{mol}{L} \rightarrow M = \frac{0.060 mol}{1.50 L} =$ 0.04 M $NaHCO_3$

2. Calculate the number of moles of NaCl contained in 0.500L of a 1.5M solution.

0.75 mol NaCl

3. Calculate the molarity of 34.2 **grams** of HF in 0.5 L of solution. **(Start with gram→mol)**

MW

$M = \frac{mol}{L}$ $\quad \frac{34.2 g}{20.008 g} \left| \frac{1 mol}{} \right. = 1.709 mol$ $\quad M = \frac{mol}{L} = \frac{1.709 mol}{0.5 L} =$ 3.42 M

4. What is the molarity if 1.0 mol of KCl is dissolved in 750.0 **mL** of solution (1L = 1000 mL)?

1.33 M KCl

4. Continue swirling or stirring with a stir rod until all of the solute is dissolved.

Mini Lab – Make a Stock Solution :)

Goal: Make 50 mL of a ~~0.50~~ 0.10 M $CuCl_2$ solution.

Pre Lab Questions and Calculations:

1. The **solute** in this lab is $CuCl_2$ and the **solvent** in this lab is H_2O.
2. What formula is used to calculate molarity? $M = \frac{\text{mol solute}}{\text{L solution}}$
3. Convert the volume (50 mL) to **Liters**.

$\frac{50 mL}{} \left| \frac{L}{mL} \right. =$ ___ L