Name: $\qquad$ Date: $\qquad$

### 8.7 Concentration Classwork-Homework!

For Reference:

| Molarity | Parts per million |
| :---: | :---: |
| molarity $=\frac{\text { moles of solute }}{\text { liters of solution }}$ | parts per million $=\frac{\text { grams of solute }}{\text { grams of solution }} \times 1000000$ |

Example 1: What is the concentration of 200 L solution containing 600 moles of $\mathrm{KNO}_{3}$ ?
Example 2: Which solution is the most concentrated?
(1) 1 mole of solute dissolved in 1 liter of solution
(2) 2 moles of solute dissolved in 3 liters of solution
(3) 6 moles of solute dissolved in 4 liters of solution
(4) 4 moles of solute dissolved in 8 liters of solution

Example 3: What is the total number of moles of $\mathrm{H}_{2} \mathrm{SO}_{4}$ needed to prepare 5.0 liters of a 2.0 M solution of $\mathrm{H}_{2} \mathrm{SO}_{4}$ ?
Example 4: How many moles of solute are contained in 200 milliliters of a 1 M solution?
Example 5: A 3.2-gram sample of air contains 0.00074 gram of hydrogen cyanide. Determine the concentration, in parts per million, of the hydrogen cyanide in this sample.

## Classwork!

1. Which phrase describes the molarity of a solution?
(1) liters of solute per mole of solution
(2) liters of solution per mole of solution
(3) moles of solute per liter of solution
(4) moles of solution per liter of solution
2. A $3.0 \mathrm{M} \mathrm{HCl}(\mathrm{aq})$ solution contains a total of
(1) 3.0 grams of HCl per liter of water
(2) 3.0 grams of HCl per mole of solution
(3) 3.0 moles of HCl per liter of solution
(4) moles of HCl per mole of water
3. What is the molarity of a 500 L solution containing 5.5 moles of KI?
4. What is the molarity of a solution that contains 4.0 mol of NaOH in 0.50 L of solution.
5. Which type of concentration is calculated when the grams of solute is divided by the grams of the solution, and the result is multiplied by $1,000,000$ ?
(1) molarity
(2) parts per million
(3) percent by mass
(4) percent by volume
6. A swimming pool reports that chlorine is present at 20 g in 100 g of water. Express this in terms of parts per million. (ppm)
7. A 2400.-gram sample of an aqueous solution contains 0.012 gram of $\mathrm{NH}_{3}$. What is the concentration of $\mathrm{NH}_{3}$ in the solution, expressed as parts per million?
(1) 5.0 ppm
(2) 15 ppm
(3) $20 . \mathrm{ppm}$
(4) $50 . \mathrm{ppm}$
8. How many moles of magnesium chloride $\left(\mathrm{MgCl}_{2}\right)$ are needed to make 6.0 L of a 3.0 M solution?
9. What is the molarity of a 500 L solution containing 249 g of KI ?
10. How many moles of LiF would be required to produce a 2.5 M solution with a volume of 1.5 L ?
11. Determine the molarity of 500 mL of a solution with 0.35 mol of dissolved solute.
12. A 200 mL sample of a solution contains 4.0 g of NaOH . What is its molarity?
13. How many grams of $\mathrm{CaCl}_{2}$ would be required to produce a 3.5 M (molar) solution with a volume of 2.0L?
14. How many grams of $\mathrm{KNO}_{3}$ are present in 250 mL of 2.0 M potassium nitrate solution?
15. How many moles of $\mathrm{MgSO}_{4}$ are contained in 50 mL of a 3.0 M solution?
16. The molarity of an aqueous solution of NaCl is defined as the
(1) grams of NaCl per liter of water
(2) grams of NaCl per liter of solution
(3) moles of NaCl per liter of water
(4) moles of NaCl per liter of solution
17. What is the molarity of 1.5 liters of an aqueous solution that contains 52 grams of lithium fluoride, LiF , (gram-formula mass $=26$ grams $/$ mole) ?
(1) 1.3 M
(2) 2.0 M
(3) 3.0 M
(4) 0.75 M
18. Using Table G, what is the concentration of a saturated $\mathrm{NaNO}_{3}$ solution at 10 degrees Celsius in 100 mL of water (remember 1 gram of water $=1 \mathrm{~mL}$ of water).
19. CHALLENGE: Let's say that we have a supersaturated solution of $\mathrm{NaNO}_{3}$ at 10 degrees Celsius in 100 mL of water. What is the concentration of the $100 \mathrm{~mL} \mathrm{NaNO}_{3}$ solution and WHY?!
