Pre-AP Chemistry
Unit #11—Solutions
Solution and Solution Stoichiometry Formulas

Solution Formulas

Mass Percent/Percent by Mass

$$\text{Mass Percent} = \frac{\text{mass of solute}}{\text{total mass of solution}}$$

Volume Percent/Percent by Volume

$$\text{Volume Percent} = \frac{\text{volume of solute}}{\text{total volume of solution}}$$

Mole Fraction

$$\text{Mole Fraction} = \frac{\text{mole of component}}{\text{total moles of all components}}$$

Molality

$$\text{Molality (m)} = \frac{\text{moles of solute}}{\text{kilograms of solvent}}$$

Molarity

$$\text{Molarity (M)} = \frac{\text{moles of solute}}{\text{liters of solution}}$$

Liters to Moles

$$\frac{\text{?? L soln “A”} \mid \text{?? mol “A”}}{\mid \text{1 L soln “A”}} = \text{?? mol “A”}$$

Moles to Liters

$$\frac{\text{?? mol “A”} \mid \text{1 L soln “A”}}{\mid \text{?? mol “A”}} = \text{?? L soln “A”}$$

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Milliliters to Moles

$$\frac{\text{?? mL soln "A"} \mid \text{?? L soln "A"} \mid \text{?? mol "A"}}{\mid \text{1000 mL soln "A"} \mid \text{1 L soln "A"}} = \text{?? mol "A"}$$

Moles to Milliliters

$$\frac{\text{?? mol "A"} \mid \text{1 L soln "A"} \mid \text{1000 mL soln "A"}}{\mid \text{?? mol "A"} \mid \text{1 L soln "A"}} = \text{?? mL soln "A"}$$

Liters to Grams

$$\frac{\text{?? L soln "A"} \mid \text{?? mol "A"} \mid \text{Molar Mass (g) of "A"}}{\mid \text{1 L soln "A"} \mid \text{1 mol "A"}} = \text{?? g "A"}$$

Grams to Liters

$$\frac{\text{?? g"A"} \mid \text{1 mol "A"} \mid \text{1 L soln "A"}}{\mid \text{Molar Mass (g) of "A"} \mid \text{?? mol "A"}} = \text{?? L soln "A"}$$

Milliliters to Grams

$$\frac{\text{?? mL soln "A"} \mid \text{?? L soln "A"} \mid \text{?? mol "A"} \mid \text{Molar Mass (g) "A"}}{\mid \text{1000 mL soln "A"} \mid \text{1 L soln "A"} \mid \text{1 mol "A"}} = \text{?? g "A"}$$

Grams to Milliliters

$$\frac{\text{?? g "A"} \mid \text{1 mol "A"} \mid \text{1 L soln "A"} \mid \text{1000 mL soln "A"}}{\mid \text{Molar Mass (g) "A"} \mid \text{?? mol "A"} \mid \text{1 L soln "A"}} = \text{?? mL "A"}$$

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Solution Stoichiometry Formulas

Liters to Grams

$$\frac{\text{?? L soln “A”}}{} \left| \frac{\text{?? mol “A”}}{\text{1 L soln “A”}} \right| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} \left| \frac{\text{Molar Mass (g) “B”}}{\text{1 mol “B”}} \right. = \text{?? g “B”}$$

Grams to Liters

$$\frac{\text{?? g “A”}}{} \left| \frac{\text{1 mol “A”}}{\text{Molar Mass (g) “A”}} \right| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} \left| \frac{\text{1 L soln “B”}}{\text{?? mol “B”}} \right. = \text{?? L soln “B”}$$

Milliliters to Grams

$$\frac{\text{?? mL soln “A”}}{} \left| \frac{\text{1 L soln “A”}}{\text{1000 mL soln “A”}} \right| \frac{\text{?? mol “A”}}{\text{1 L soln “A”}} \left| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} \right| \frac{\text{Molar Mass (g) “B”}}{\text{1 mol “B”}} = \text{?? g “B”}$$

Grams to Milliliters

$$\frac{\text{?? g “A”}}{} \left| \frac{\text{1 mol “A”}}{\text{Molar Mass (g) “A”}} \right| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} \left| \frac{\text{1 L soln “B”}}{\text{?? mol “B”}} \right| \frac{\text{1000 mL soln “B”}}{\text{1 L soln “B”}} = \text{?? L soln “B”}$$

Moles to Liters

$$\frac{\text{?? mol “A”}}{} \left| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} \right| \frac{\text{1 L soln “B”}}{\text{?? mol “B”}} = \text{?? L soln “B”}$$

Liters to Moles

$$\frac{\text{?? L soln “A”}}{} \left| \frac{\text{?? mol “A”}}{\text{1 L soln “A”}} \right| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} = \text{?? mol “B”}$$

Moles to Milliliters

$$\frac{\text{?? mol “A”}}{} \left| \frac{\text{?? mol “B”}}{\text{?? mol “A”}} \right| \frac{\text{1 L soln “B”}}{\text{?? mol “B”}} \left| \frac{\text{1000 mL soln “B”}}{\text{1 L soln “B”}} \right. = \text{?? mL soln “B”}$$

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Milliliters to Moles

$$\frac{??\text{ mL soln “A”}}{} \left| \frac{1\text{ L soln “A”}}{1000\text{ mL soln “A”}} \right| \frac{??\text{ mol “A”}}{1\text{ L soln “A”}} \left| \frac{??\text{ mol “B”}}{??\text{ mol “A”}} \right| = ??\text{ mol “B”}$$

Milliliters to Milliliters

$$\frac{??\text{ mL soln “A”}}{} \left| \frac{1\text{ L soln “A”}}{1000\text{ mL soln “A”}} \right| \frac{??\text{ mol “A”}}{1\text{ L soln “A”}} \left| \frac{??\text{ mol “B”}}{??\text{ mol “A”}} \right| \frac{1\text{ L soln “B”}}{??\text{ mol “B”}} \left| \frac{1000\text{ mL soln “B”}}{1\text{ L soln “B”}} \right| = ??\text{ mL soln “B”}$$

Milliliters to Liters

$$\frac{??\text{ mL soln “A”}}{} \left| \frac{1\text{ L soln “A”}}{1000\text{ mL soln “A”}} \right| \frac{??\text{ mol “A”}}{1\text{ L soln “A”}} \left| \frac{??\text{ mol “B”}}{??\text{ mol “A”}} \right| \frac{1\text{ L soln “B”}}{??\text{ mol “B”}} = ??\text{ L soln “B”}$$

Liters to Milliliters

$$\frac{1\text{ L soln “A”}}{} \left| \frac{??\text{ mol “A”}}{1\text{ L soln “A”}} \right| \frac{??\text{ mol “B”}}{??\text{ mol “A”}} \left| \frac{1\text{ L soln “B”}}{??\text{ mol “B”}} \right| \frac{1000\text{ mL soln “B”}}{1\text{ L soln “B”}} = ??\text{ mL soln “B”}$$

Liters to Liters

$$\frac{1\text{ L soln “A”}}{} \left| \frac{??\text{ mol “A”}}{1\text{ L soln “A”}} \right| \frac{??\text{ mol “B”}}{??\text{ mol “A”}} \left| \frac{1\text{ L soln “B”}}{??\text{ mol “B”}} \right| = ??\text{ L soln “B”}$$