

## CONCEPT: CALCULATING MOLAR MASS

● **Molar Mass** is a physical property that represents the mass of a substance divided by the amount of that substance.

□ The SI units for mass is kg and the amount of substance is moles, but molar mass is in \_\_\_\_\_.

### Molar Mass Formula

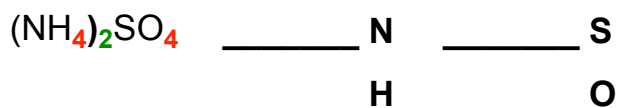
Molar Mass = \_\_\_\_\_

□ Molar mass is also referred to as \_\_\_\_\_ weight, \_\_\_\_\_ weight or \_\_\_\_\_ mass.

**EXAMPLE:** Calculate the molar mass of the compound  $(\text{NH}_4)_2\text{SO}_4$ .

**STEP 1:** Count the **number** of each element within the given compound.

□ If elements are within parentheses, just remember to distribute the **subscript** to each element.



**STEP 2:** Find the **atomic masses** of each element from the Periodic Table.

7 <b>N</b> Nitrogen 14.01	1 <b>H</b> Hydrogen 1.008	16 <b>S</b> Sulfur 32.07	8 <b>O</b> Oxygen 16.00
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**STEP 3:** Multiply together the **number** of each element with their **atomic masses** from the Periodic Table.

$$\underline{\hspace{1cm}} \text{ N } \times \text{ 14.01 g/mol } = \underline{\hspace{1cm}} \text{ g/mol }$$

$$\underline{\hspace{1cm}} \text{ H } \times \text{ 1.008 g/mol } = \underline{\hspace{1cm}} \text{ g/mol }$$

$$\underline{\hspace{1cm}} \text{ S } \times \text{ 32.07 g/mol } = \underline{\hspace{1cm}} \text{ g/mol }$$

$$\underline{\hspace{1cm}} \text{ O } \times \text{ 16.00 g/mol } = \underline{\hspace{1cm}} \text{ g/mol }$$

**STEP 4:** Add up the totals after multiplication to determine the molar mass of the compound.

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**PRACTICE:** Calculate the molecular weight of  $\text{C}_3\text{H}_5\text{N}_3\text{O}_3$ .

**PRACTICE:** The reaction between nickel metal and hydrochloric acid is not a simple dissolution. The product formed is  $\text{NiCl}_2 \cdot 6 \text{H}_2\text{O}$  (s), nickel (II) chloride hexahydrate, which has exactly 6 waters of hydration in the crystal lattice for every nickel ion. What is the molar mass of nickel (II) chloride hexahydrate,  $\text{NiCl}_2 \cdot 6 \text{H}_2\text{O}$  (s)?

**PRACTICE:** What is the molar mass of diazepam also known as Valium if 0.05570 mol weighs 15.86 g?