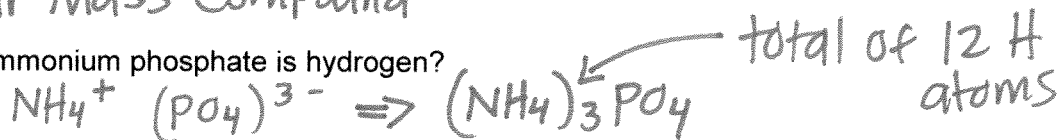


NOTES

Percent Composition

% Composition Formula: $\frac{\text{Molar Mass Element}}{\text{Molar Mass Compound}} \times 100$

Example 1: What percentage of ammonium phosphate is hydrogen?



$\% \text{H} = \frac{\text{Mass of 12 H atoms}}{\text{Mass } (\text{NH}_4)_3\text{PO}_4} \times 100 = \frac{(12)(1.01)}{149.12} \times 100 = \boxed{8.13\% \text{ H}}$

Example 2: Which of the following compounds contains the greatest percentage of iron by mass?

(a) FeCl_3 $\% \text{Fe} = \frac{\text{Mass of 1 Fe atom}}{\text{Mass } \text{FeCl}_3} \times 100 = \frac{55.85}{162.2} \times 100 = 34.43\% \text{ Fe}$

(b) FeO $\% \text{Fe} = \frac{\text{Mass of 1 Fe atom}}{\text{Mass } \text{FeO}} \times 100 = \frac{55.85}{71.85} \times 100 = 77.73\% \text{ Fe}$

(c) Fe_2O_3 $\% \text{Fe} = \frac{\text{Mass of 2 Fe atoms}}{\text{Mass } \text{Fe}_2\text{O}_3} \times 100 = \frac{(2)(55.85)}{159.7} \times 100 = 69.94\% \text{ Fe}$

(d) FeCl_2 $\% \text{Fe} = \frac{\text{Mass of 1 Fe atom}}{\text{Mass } \text{FeCl}_2} \times 100 = \frac{55.85}{126.75} \times 100 = 44.06\% \text{ Fe}$

Molecular Formula vs Empirical Formula

An empirical formula is:

A molecular formula is:

CH_2O is a _____

$\text{C}_6\text{H}_{12}\text{O}_6$ is a _____

- Empirical Formula is a _____ form of Molecular formula
- Different compounds can have the _____ empirical formula but _____ molecular formulas.

Empirical Formulas

- Step 1: Change ____ sign to ____ - if you are given grams, skip this step
- Step 2: Convert masses to moles using _____
- Step 3: _____ all # of moles by the _____ value.
- Step 4: If dividing gave you _____, then multiply by _____
- Step 5: If dividing gave you _____ or _____, then multiply by _____
- Step 6: If step 4 or 5 do not apply, then _____ step 3 values to a _____ number
- Step 7: Once you know the _____, place them as _____ in the formula

Practice Problems:

- A compound contains 3.26g of arsenic and 1.04g of oxygen. What is the empirical formula?

- Find the empirical formula of a compound that is 33.38% Na, 22.65% S, and 44.90% O.
- What is the empirical formula of a compound that is 62.10% C, 13.80% H, and 24.10% N?

Molecular Formulas

To find the molecular formula you must:

- Find the _____ if not given
- Determine the _____ of the _____
- $\frac{\text{MM molecular formula}}{\text{MM empirical formula}} = X$
- _____ each _____ in the empirical formula by "X"

Practice Problems

- The empirical formula of a compound is CH; the molecular molar mass is 78.11 g/mol. What is its molecular formula?
- A compound has an empirical formula of CH₃O and a molecular mass of 62.00 g/mol. What is its molecular formula?
- A compound is 26.70% C, 2.20% H, and 71.10% O. Its molecular mass is 90.00 g/mol. What is its molecular formula?

Summary

Determine the molecular and empirical formula for each:

