

## Cycle 2 Chemistry 2 Lesson 4

Determining a compound's molecular formula from an empirical formula

### AGENDA

**CLASSWORK:** Problem Set #2

**HOMEWORK:** Empirical & Molecular WS odd #s only!




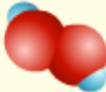
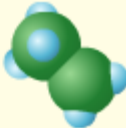
### Using Analytical Data, *continued* Molecular Formulas Are Multiples of Empirical Formulas

- The formula for an ionic compound shows the simplest whole-number ratio of the large numbers of ions in a crystal of the compound.
- A **molecular formula** is a whole-number multiple of the empirical formula.
- The molar mass of any compound is equal to the molar mass of the empirical formula times a whole number,  $n$ .





# Comparing Molecular and Empirical Formulas

Compound	Empirical formula	Molecular formula	Structure
Water	$\text{H}_2\text{O}$	$\text{H}_2\text{O}$	
Hydrogen peroxide	$\text{HO}$	$\text{H}_2\text{O}_2$	
Ethane	$\text{CH}_3$	$\text{C}_2\text{H}_6$	

Play 

End  
of  
Slide

 Chapter menuResources 



### Determining a Molecular Formula from an Empirical Formula

#### Sample Problem H

The empirical formula for a compound is  $P_2O_5$ . Its experimental molar mass is 284 g/mol. Determine the molecular formula of the compound.



Chapter menu

Resources





### Determining a Molecular Formula from an Empirical Formula

#### Sample Problem H Solution

Find the molar mass of the empirical formula  $P_2O_5$ .

$$\begin{array}{r} 2 \times \text{molar mass of P} = 61.94 \text{ g/mol} \\ + \quad 5 \times \text{molar mass of O} = 80.00 \text{ g/mol} \\ \hline \text{molar mass of } P_2O_5 = 141.94 \text{ g/mol} \end{array}$$





## Determining a Molecular Formula from an Empirical Formula

### Sample Problem H Solution, *continued*

$$n = \frac{\text{experimental molar mass of compound}}{\text{molar mass of empirical formula}}$$

$$n = \frac{284 \text{ g/mol}}{141.94 \text{ g/mol}} = 2.00$$

$$n (\text{empirical formula}) = 2 (\text{P}_2\text{O}_5) = \text{P}_4\text{O}_{10}$$

