# *Combustion Analysis*

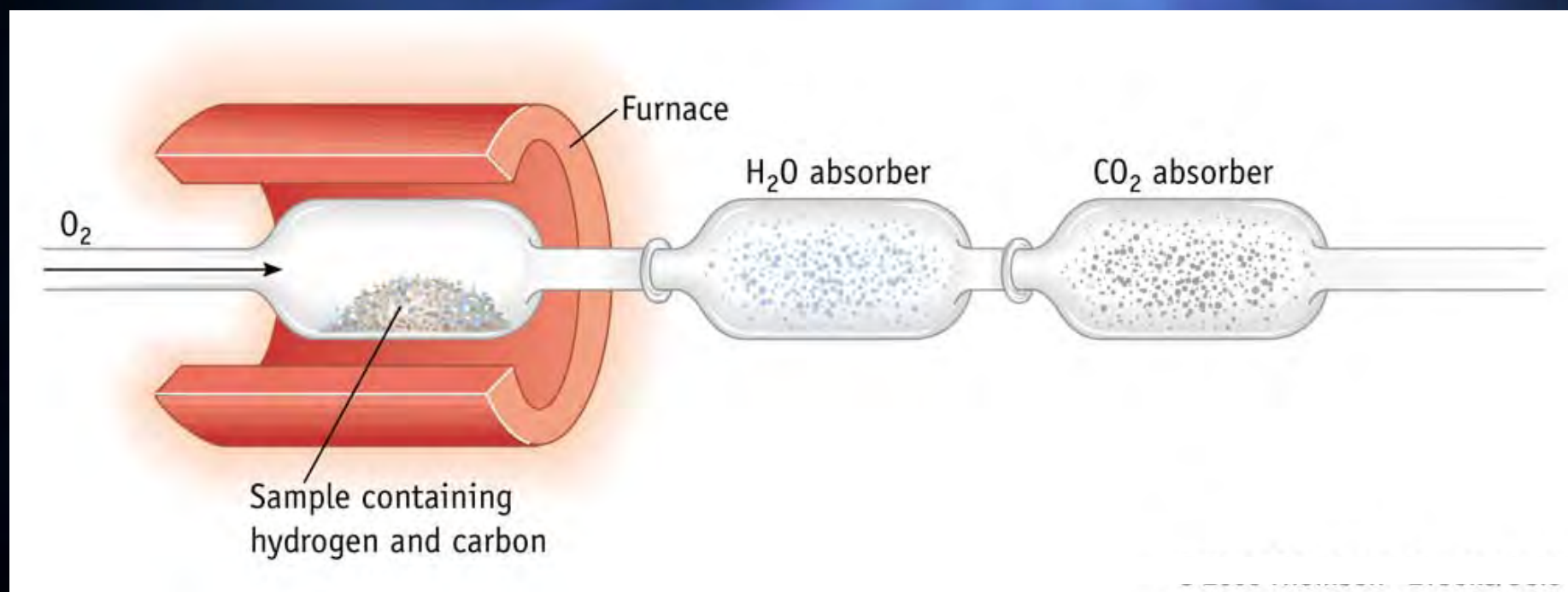### *for the determination of the empirical formula of an organic compound*

Chapter 3

**Note Set M**

## Combustion Analysis

✦ The empirical formula for a compound can be determined by burning it and analyzing the products.



Furnace

$H_2O$ absorber

$CO_2$ absorber

$O_2$

Sample containing hydrogen and carbon

# Combustion Analysis Example

✦ A sample of an unknown hydrocarbon is burned completely in oxygen to give 1.993 g of carbon dioxide and 0.9519 g of water.

✦ What is the empirical formula of the compound?

## Combustion Analysis Example

Caproic acid, the compound responsible for the unpleasant aroma of dirty socks, contains only C, H, and O.

When a 0.450-g sample of the compound is burned in oxygen, 1.023 g of $CO_2$ and 0.418 g of $H_2O$ are collected.

What is the empirical formula of the compound?

# Combustion Analysis Example (continued):

1. Consider the reaction occurring:

2. Calculate the moles of C in the $CO_2$:

3. Calculate the moles of H in the $H_2O$:

4. Calculate the mass of O in the compound:

5. Calculate the moles of each element in the compound and their ratios to find the empirical formula: