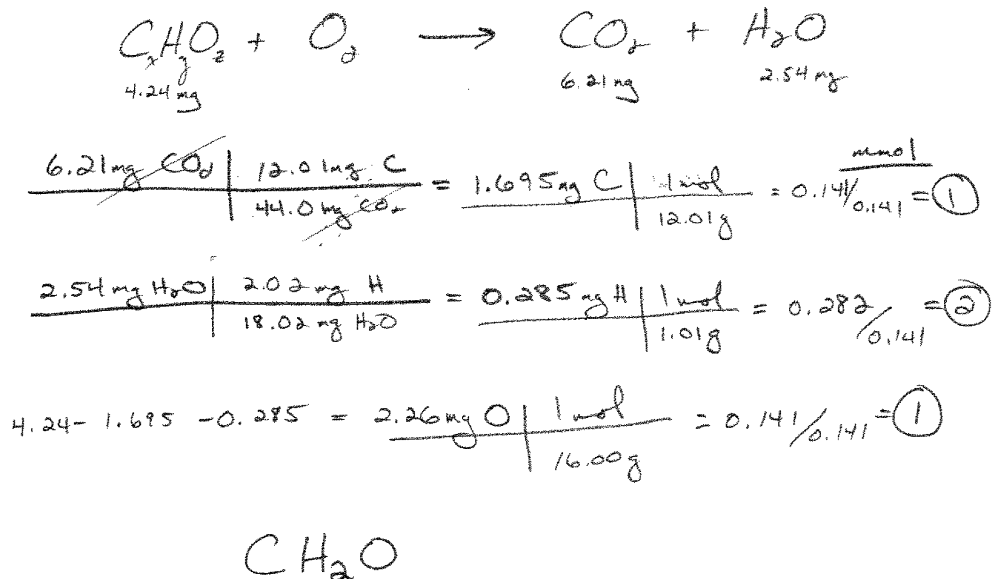
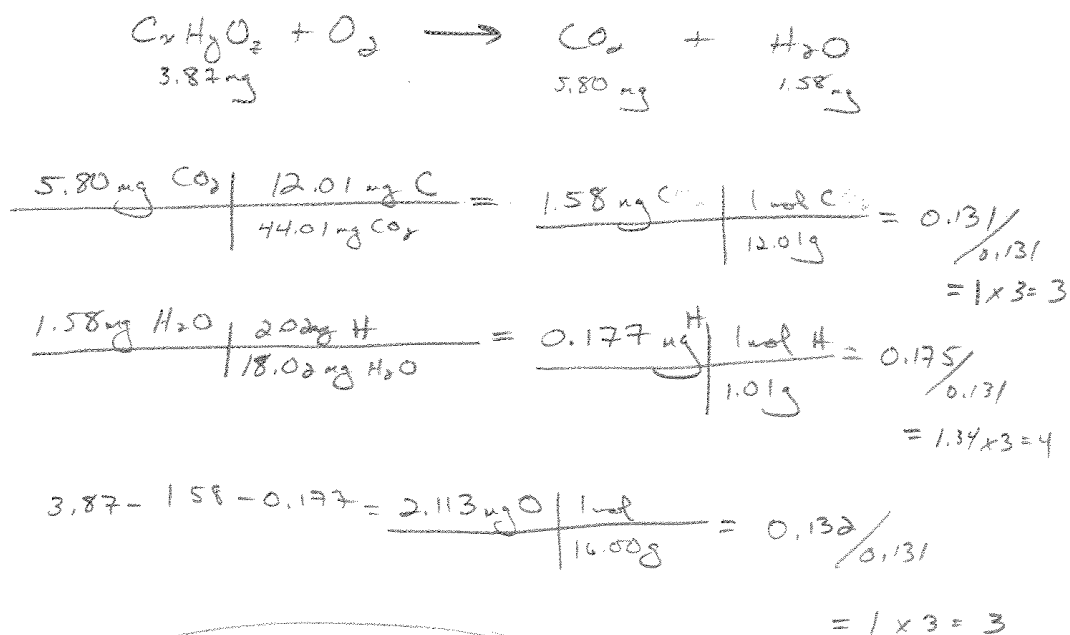


Combustion Analysis 1

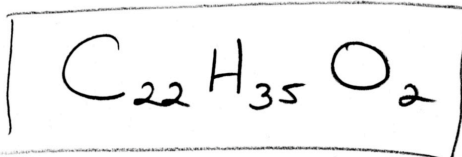
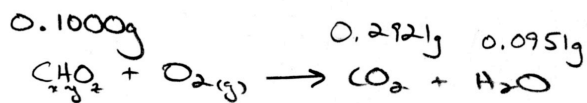
1. A 4.24-mg sample of a carboxylic acid (composed of only C, H, and O) is burned. The reaction produces 6.21 mg of carbon dioxide and 2.54 mg of water. The compound was found to have a molar mass of ~ 180 g/mol in a separate experiment. What is the molecular formula of the compound?



2. A 3.87-mg sample of ascorbic acid (containing C, H, and O only) produces 5.80 mg CO₂ and 1.58 mg H₂O on combustion. What is the empirical formula of ascorbic acid?



3. Combustion of 0.1000 g of a compound consisting only of C, H and O caused a 0.2921 g increase in the mass of the CO₂ absorber and a 0.0951 g increase in the mass of the H₂O absorber. What is the empirical formula of the compound?



$$\frac{0.2921\text{g CO}_2}{44.01\text{g CO}_2} \times \frac{1\text{mol CO}_2}{1\text{mol CO}_2} \times \frac{1\text{mol C}}{1\text{mol CO}_2} = 0.006637 \text{ mol C} \times \frac{12.01\text{g C}}{1\text{mol C}} = 0.0797\text{g}$$

(11) × 2

$$\frac{0.0951\text{g H}_2\text{O}}{18.02\text{g H}_2\text{O}} \times \frac{1\text{mol H}_2\text{O}}{1\text{mol H}_2\text{O}} \times \frac{2\text{mol H}}{1\text{mol H}_2\text{O}} = 0.010555 \text{ mol H} \times \frac{1.008\text{g H}}{1\text{mol H}} = 0.01064\text{g}$$

(17.5) × 2

$$\begin{array}{r} 0.1000\text{g CHO} \\ - 0.0797\text{g C} \\ - 0.0106\text{g H} \\ \hline 0.0096\text{g O} \end{array} \quad \frac{0.0096\text{g O}}{16.00\text{g}} \times \frac{1\text{mol O}}{1\text{mol O}} = 0.00060375 \text{ mol O} \quad (1) \times 2$$

4. A compound consisting of C, H and O only, has a molar mass of 660 g/mol.

Combustion of 0.1000 g of this compound caused a 0.2921 g increase in the mass of the CO₂ absorber and a 0.0951 g increase in the mass of the H₂O absorber.

What is the empirical formula of the compound?

What is the molecular formula of the compound?

Note: # 4 is a repeat of # 3, but also asks for the molecular formula.

$$\frac{M_m = 660\text{g/mol}}{\text{Emp mass} = 331.5} \approx (2)$$

