

HW 3-3 – Combustion Analysis; Molecular Formula

Name _____

Problems pg. 106 #3.98, 3.137, 3.52, 3.54, 3.119 and 2 extra problems

- A. After combustion with excess oxygen, a 12.501 g sample of a petroleum compound produced 38.196 g of carbon dioxide and 18.752 of water. A previous analysis determined that the compound does not contain oxygen. Establish the empirical formula of the compound.**
- 3.98 A sample of a compound of Cl and O reacts with an excess of H₂ to give 0.233 g of HCl and 0.403 g of H₂O. Determine the empirical formula of the compound.**
- 3.137 When 12.1 g of *tert*-butyl ether (a compound of C, H, and O) are burned in an apparatus like the one shown in Fig 3.6, 30.1 g of CO₂ and 14.8 g of H₂O are formed. What is the empirical formula of the compound?**
- B. After combustion with excess oxygen, a 28.39 g sample of propanethiol produced 49.22 g of carbon dioxide, 26.87 of water and 29.84 g SO₃. The compound produced no other oxides. Determine the empirical formula of the compound.**

- 3.52** The empirical formula of a compound is CH. If the molar mass of this compound is 78 g, what is its molecular formula?
- 3.54** Monosodium glutamate (MSG) has the following composition by mass: 35.51% C, 4.77% H, 37.85% O, 8.29% N, and 13.60% Na. What is its molecular formula if its molar mass is 169 g?
- 3.119** Lysine contains C, H, O, and N. In one experiment, the complete combustion of 2.175 g of lysine gave 3.94 g CO₂ and 1.89 g H₂O. When reduced in hydrogen, a second 2.175 g sample of lysine produced 0.506 g NH₃. First determine the empirical formula for lysine, then given the molecular mass of lysine is 150 g/mol, determine its molecular formula.