



3. Prozac is a common antidepressant that contains carbon, hydrogen, fluorine, nitrogen and oxygen. 0.2543 g of Prozac is analyzed by combustion analysis. There are 0.6151 g of  $\text{CO}_2$ , 0.1333 g of  $\text{H}_2\text{O}$ , 0.0666 g of  $\text{OF}_2$  and 0.0115 g of  $\text{N}_2$  produced. The molar mass is 309.3 g/mol.

a. What is the *empirical formula* of Prozac?

b. What is the *molecular formula* of Prozac?

4. When dinitrogen tetroxide and hydrazine react they produce water and nitrogen gas. The density of dinitrogen tetroxide is  $1.44 \text{ g cm}^{-3}$  and the density of hydrazine is  $1.02 \text{ g cm}^{-3}$ . What volume of hydrazine, in L, is needed to react completely with 15.3 L of dinitrogen tetroxide?

5. A stable element is discovered with an atomic number of 134. There are two naturally occurring isotopes of this element. One has an abundance of 42.63% and a relative atomic mass of 334.907863 amu. The other has a relative atomic mass of 336.916354 amu. Calculate the *relative average atomic mass* of the element.
6. A lab analyzes a sample of river water for the amount of mercury(I) ion present. The lab technician adds enough sodium sulfate solution to a 25.00 mL aliquot of the river water to ensure that all the mercury precipitates out. She filters and dries the precipitate and determines the mass to be 33.27 mg. What is the *molar concentration of mercury(I) ion* in the river water?

7. Modern pennies are made with a core of zinc and a thin cladding of copper. The density of copper is  $8.69 \text{ g cm}^{-3}$  and the density of zinc is  $7.140 \text{ g cm}^{-3}$ . A stack of pennies has a mass of  $37.500 \text{ g}$  and a volume of  $5228.68 \text{ mm}^3$ . What is the percent by mass of copper in a penny?