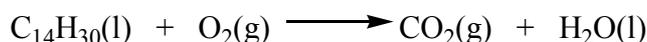


## Homework

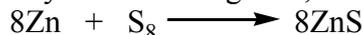
1. The empirical formula of *para*-dichlorobenzene, used as a moth repellent, is  $C_6H_4Cl_2$ . The molecular mass of compound is 147 u (amu.). What is the molecular formula?
2. Resorcinol, used in manufacturing resins, drugs, and other products, is 65.44% C, 5.49% H, and 29.07% O by mass. Its molecular mass is 110 u (amu.). What is its molecular formula?
3. Kerosene is a mixture of hydrocarbons used in domestic heating and as a jet fuel. Assume that kerosene can be represented as  $C_{14}H_{30}$  and that it has a density of 0.763 g/mL. How many grams of  $CO_2$  are produced by the combustion of 1.00 gal (3.785 L) of kerosene?



4. How many milliliters of dilute  $HCl(aq)$  ( $d = 1.045$  g/mL) that is 9.50%  $HCl$  by mass are required to react completely with 0.858 g  $Al$ ?



5. Calculate the theoretical yield of  $ZnS$ , in grams, that can be made from 0.488 g  $Zn$  and 0.503 g  $S_8$ . If the actual yield is 0.606 g  $ZnS$ , what is the percent yield?



6. A student prepares ammonium bicarbonate by the reaction



She uses 14.8 g  $NH_3$  and 41.3 g  $CO_2$ . Water is present in excess. What is her actual yield of ammonium bicarbonate if she obtains a 74.7% yield in the reaction?

7. Suppose you need about 80 mL of 0.100 M  $AgNO_3$ . You have available about 150 mL of 0.0400 M  $AgNO_3$  and also about 1.0 g of solid  $AgNO_3$ . Assume that you have available standard laboratory equipment such as an analytical balance, 10.00-mL and 25.00-mL pipets, 100.0-mL and 250.0-mL volumetric flasks, and so on. Describe how you would prepare the desired  $AgNO_3$  solution, including actual masses or volumes required.
  8. How many grams of  $BaSO_4(s)$  are formed when an excess of  $BaCl_2(aq)$  is added to 635 mL of 0.314 M  $Na_2SO_4(aq)$ ?
- $$BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$$
9. What volume of 0.0250 M  $MgCl_2$  should be diluted to 250.0 mL to obtain a solution with  $[Cl^-] = 0.0135$  M?
  10. When aqueous solutions of copper(II) nitrate and potassium carbonate are mixed, a precipitate forms. Write the net ionic equation for this reaction.