Stoichiometry Review Problems

1. How many moles of O_2 should be supplied to burn 1 mol of C_3H_8 (propane) molecules in a camping stove?

2. How many moles of O_2 molecules should be supplied to burn 1 mol of CH_4 molecules in a domestic furnace?

3. Calculate the mass of Al_2O_3 produced when 100 g of aluminum burns in oxygen.

4. "Slaked lime" ($Ca(OH)_2$) is formed from "quick-lime" (CaO) by adding water. What mass of water is needed to convert 10 kg of quicklime to slaked lime? What mass of slaked lime is produced?

5. Camels store the fat tristearin ($C_{57}H_{110}O_6$) in the hump. As well as being a source of energy, the fat is a source of water, because when it is used the following reaction takes place. What mass of water is available from 1.0 kg of fat?

$$2C_{57}H_{110}O_6(s) + 163O_2(g) \rightarrow 114CO_2(g) + 110H_2O(l)$$

6. The compound diborane (B_2H_6) was at one time considered for use as a rocket fuel. How many grams of liquid oxygen would a rocket have to carry to burn 10 kg of diborane completely? The products of the combustion are B_2O_3 and H_2O.

7. Given the balanced chemical equation, how many moles of sodium bromide ($NaBr$) could be produced from 0.172 mol of bromine (Br_2)?

$$Br_2 + 2NaI \rightarrow 2NaBr + I_2$$

8. How many formula units of calcium oxide (CaO) can be produced from 4.9×10^5 molecules of oxygen gas (O_2) that react with calcium (Ca) according to this balanced chemical equation?

$$2Ca(s) + O_2(g) \rightarrow 2CaO(s)$$

9. Aluminum metal (Al) reacts with sulfur (S) to produce aluminum sulfide (Al_2S_3) according to the following chemical equation. How many atoms of aluminum will react completely with 1.33×10^{24} atoms of sulfur?

$$2Al(s) + 3S(s) \rightarrow Al_2S_3(s)$$