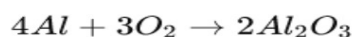Name _____   Date _____

Stoichiometry Problems

The reaction of aluminum with oxygen produces aluminum oxide according to the balanced equation below:

$$4Al + 3O_2 \rightarrow 2Al_2O_3$$

1.How many moles of aluminum oxide are produced from 5.4 grams of aluminum?
2.How many moles of oxygen gas are required to completely react with 12.0 grams of aluminum?
3.How many grams of aluminum are needed to produce 15.0 grams of aluminum oxide?
4.If 10.0 grams of oxygen react with aluminum, how many grams of aluminum oxide will be formed?

1. How many moles of aluminum oxide are produced from 5.4 grams of aluminum?

(26.98 g Al) / (5.4 g/mol) = 0.200 moles of Al →   4 moles of Al → 2 moles of Al_2O_3

so,

0.200 × 2/4 = 0.100 moles of Al_2O_3

2. How many moles of oxygen gas are required to completely react with 12.0 grams of aluminum?

(12.0 g Al) / (26,98 g/mol) = 0.445 moles of Al   →   4 moles of Al→3 moles of O_2

so,

0.445 × 3/4 = 0.334 moles of O_2

3. How many grams of aluminum are needed to produce 15.0 grams of aluminum oxide?

2(26.98) + 3(16.00) = 101.96 g/mol   →   (15.0 g) / (101,96 g/mol) = 0.147 moles of Al_2O_3

so,   0.147 × 4/2 = 0.294 moles of Al

0.294 × 26.98 = 7.93 g of Al

4. If 10.0 grams of oxygen react with aluminum, how many grams of aluminum oxide will be formed?

2(16.00) = 32.00 g/mol   →   (10.0 g) / (32,00 g/mol) = 0.313 moles of O_2

so,   0.313 × 2/3 = 0.209 moles of Al_2O_3

0.209 × 101.96 = 21.3 g of Al_2O_3