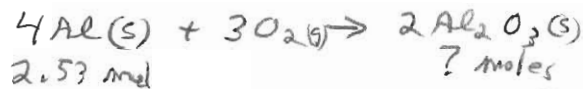


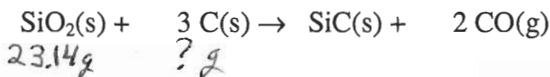
SHOW ALL WORK TO RECEIVE CREDIT.

1. (4 Pts) Aluminum reacts with oxygen to produce aluminum oxide: $4 \text{ Al(s)} + 3 \text{ O}_2\text{(g)} \rightarrow 2 \text{ Al}_2\text{O}_3\text{(s)}$
 If 2.53 moles of Al reacts with excess O_2 , how many moles of Al_2O_3 can be formed?



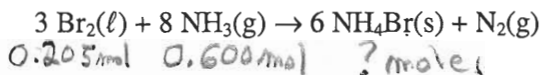
$$\frac{2.53 \text{ mol Al}}{4 \text{ mol Al}} \times \frac{2 \text{ mol Al}_2\text{O}_3}{1} = 1.27 \text{ mol Al}_2\text{O}_3$$

2. (5 Pts) What mass of carbon is needed to react completely with 23.14 grams of SiO_2 according to the following equation? (molar masses: C = 12.01, O = 16.00, Si = 28.09)



$$\frac{23.14 \text{ g SiO}_2}{60.09 \text{ g SiO}_2} \times \frac{1 \text{ mol SiO}_2}{1} \times \frac{3 \text{ mol C}}{1} \times \frac{12.01 \text{ g C}}{1} = 13.87 \text{ g C}$$

3. (6 Pts) If 0.205 moles of bromine and 0.600 moles of ammonia react according to the equation below, what is the maximum number of moles of ammonium bromide that can be produced?



$$\frac{0.205 \text{ mol Br}_2}{3 \text{ mol Br}_2} \times \frac{6 \text{ mol NH}_4\text{Br}}{1} = 0.410 \text{ mol NH}_4\text{Br}$$

$$\frac{0.600 \text{ mol NH}_3}{8 \text{ mol NH}_3} \times \frac{6 \text{ mol NH}_4\text{Br}}{1} = 0.450 \text{ mol NH}_4\text{Br}$$

theoretical yield

4. (3 Pts) What is the molar mass of nitroglycerine, $\text{C}_3\text{H}_5\text{(ONO}_2)_3$? (molar masses: C = 12.01, H = 1.01, N = 14.01, O = 16.00)

C: 3×12.01
 H: 5×1.01
 N: 3×14.01
 O: 9×16.00

$$227.11 \text{ g/mol}$$

5. (3 Pts) What is the mass percent of iron in iron(II) oxalate, FeC_2O_4 ? (molar masses: Fe = 55.85, C = 12.01, O = 16.00)

Fe 1×55.85
 C 2×12.01
 O 4×16.00

molar mass = 143.86 then $\frac{55.85}{143.86} \times 100 = 38.82\%$

6. (4 Pts) A compound contains 43.64% P with the remainder being oxygen. What is the empirical formula of the compound? (molar masses: P = 30.97, O = 16.00)

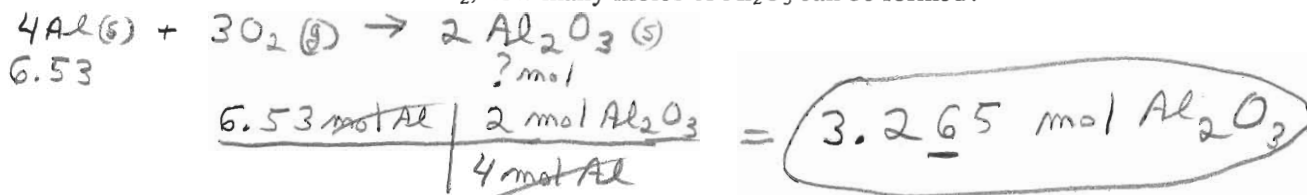
Use 100 grams:

P: $\frac{43.64 \text{ g}}{30.97 \text{ g/mol}} = 1.409 \div 1.409 = 1 \quad \times 2 = 2$

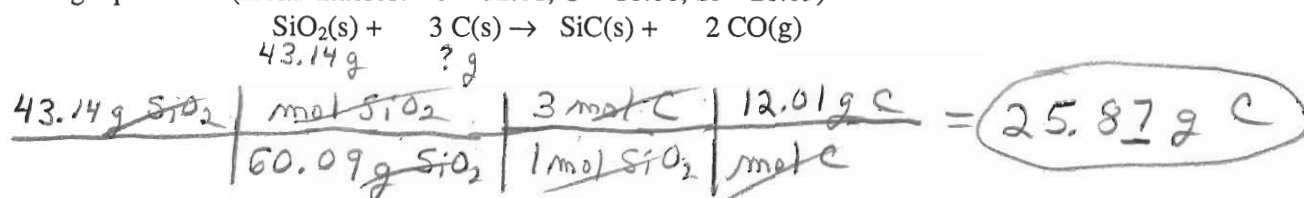
O: $\frac{56.36 \text{ g}}{16.00 \text{ g/mol}} = 3.522 \div 1.409 = 2.5 \times 2 = 5$



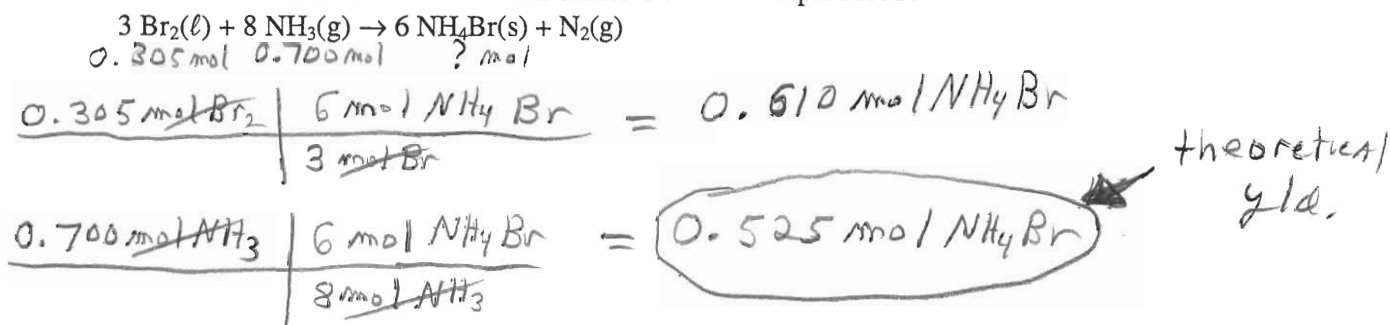
1. (4 Pts) Aluminum reacts with oxygen to produce aluminum oxide: $4 \text{Al}(s) + 3 \text{O}_2(g) \rightarrow 2 \text{Al}_2\text{O}_3(s)$
 If 6.53 moles of Al reacts with excess O_2 , how many moles of Al_2O_3 can be formed?



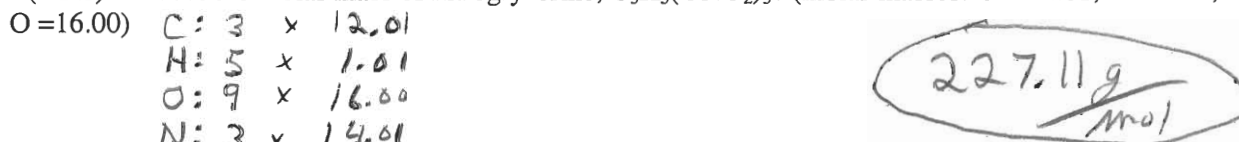
2. (5 Pts) What mass of carbon is needed to react completely with 43.14 grams of SiO_2 according to the following equation? (molar masses: C = 12.01, O = 16.00, Si = 28.09)



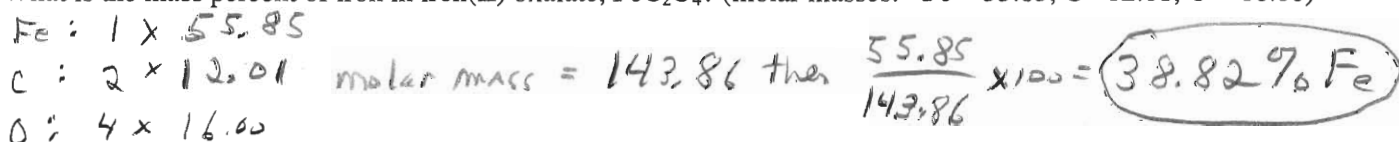
3. (6 Pts) If 0.305 moles of bromine and 0.700 moles of ammonia react according to the equation below, what is the maximum number of moles of ammonium bromide that can be produced?



4. (3 Pts) What is the molar mass of nitroglycerine, $\text{C}_3\text{H}_5(\text{ONO}_2)_3$? (molar masses: C = 12.01, H = 1.01, N = 14.01, O = 16.00)



5. (3 Pts) What is the mass percent of iron in iron(II) oxalate, FeC_2O_4 ? (molar masses: Fe = 55.85, C = 12.01, O = 16.00)



6. (4 Pts) A compound contains 43.64% P with the remainder being oxygen. What is the empirical formula of the compound? (molar masses: P = 30.97, O = 16.00)

Use 100 grams:

