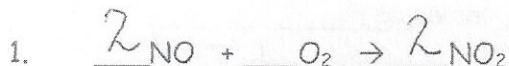


Answer each of the following questions using the equation provided. BE SURE TO BALANCE EACH EQUATION BEFORE SOLVING ANY PROBLEMS. SHOW ALL WORK.

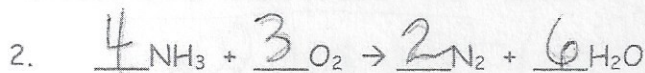


a. 2 moles of NO will react with 1 mole(s) of O_2 to produce 2 mole(s) of NO_2 .

b. $? \text{ moles NO}_2 = 3.6 \text{ moles O}_2 \times \frac{2 \text{ moles NO}_2}{1 \text{ mole O}_2} = 7.2 \text{ mole NO}_2$

c. How many moles of NO must react to form 4.67 moles of NO_2 ?

$4.67 \text{ mole NO}_2 \times \left(\frac{2 \text{ mol NO}}{2 \text{ mole NO}_2} \right) = 4.67 \text{ mol NO}$



	R	P
N	4	24
H	312	212
O	26	6

a. 20 moles of NH_3 are needed to produce 30 moles of H_2O .

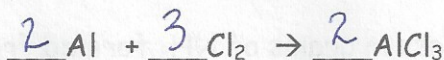
$(20 \text{ mol NH}_3) \times \left(\frac{6 \text{ mol H}_2\text{O}}{4 \text{ mol NH}_3} \right) = 30 \text{ mol H}_2\text{O}$

b. How many moles of N_2 will be produced if 3.5 moles of O_2 react?

$(3.5 \text{ mol O}_2) \times \left(\frac{2 \text{ mol N}_2}{3 \text{ mol O}_2} \right) = 2.3 \text{ mol N}_2$

Answer each of the following questions using the equation provided. BE SURE TO BALANCE EACH EQUATION BEFORE SOLVING ANY PROBLEMS. SHOW ALL WORK.

1. In a reaction between the elements aluminum and chlorine, aluminum chloride is produced.



	R	P
Al	+2	+2
Cl	+6	+6

- a. 2 moles of Al will react with 3 mole(s) of Cl_2 to produce 2 mole(s) of AlCl_3 .

- b. How many grams of AlCl_3 will be produced if 2.50 moles of Al react?

$$? \text{ mol AlCl}_3 = 2.50 \text{ mol Al} \times \left(\frac{2 \text{ mol AlCl}_3}{2 \text{ mol Al}} \right) = 2.50 \text{ mol AlCl}_3$$

- c. How many moles of Cl_2 must react to produce 12.3 g of AlCl_3 ?

$$? \text{ mol Cl}_2 = 12.3 \text{ g AlCl}_3 \times \left(\frac{1 \text{ mole AlCl}_3}{133.2 \text{ g AlCl}_3} \right) \times \left(\frac{3 \text{ mol Cl}_2}{2 \text{ mol AlCl}_3} \right) = 0.139 \text{ mol Cl}_2$$

M.M. $\text{AlCl}_3 = 133.2 \text{ g/mol}$

↑ from molar mass ↑ from balanced equation

- d. How many grams of aluminum will react with 3.4 moles of chlorine?

$$? \text{ g Al} = (3.4 \text{ mol Cl}_2) \times \left(\frac{2 \text{ mol Al}}{3 \text{ mol Cl}_2} \right) \times \left(\frac{26.98 \text{ g Al}}{1 \text{ mol Al}} \right) = 61.15 \text{ g} = 61 \text{ g Al}$$

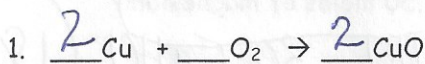
- e. If 17 grams of aluminum react, how many moles of aluminum chloride will be produced?

$$? \text{ mol AlCl}_3 = 17 \text{ g Al} \times \left(\frac{1 \text{ mol Al}}{26.98 \text{ g Al}} \right) \times \left(\frac{2 \text{ mol AlCl}_3}{2 \text{ mol Al}} \right) = 0.63 \text{ mol AlCl}_3$$

Worksheet: Mixed Problems—Mole/Mole
and Mole/Mass

Name KEY

Answer each of the following questions using the equation provided. BE SURE TO BALANCE EACH EQUATION BEFORE SOLVING ANY PROBLEMS. SHOW ALL WORK.



	R	P
Cu	2	2
O	2	2

- a. If 101 grams of copper is used, how many moles of copper (II) oxide will be formed? M.M. Cu = 63.55 g/mol

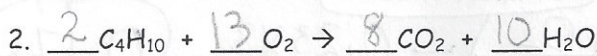
$$? \text{ mole CuO} = 101 \text{ g Cu} \times \left(\frac{1 \text{ mol Cu}}{63.55 \text{ g Cu}} \right) \times \left(\frac{2 \text{ mol CuO}}{2 \text{ mol Cu}} \right) = 1.59 \text{ mol CuO}$$

- b. If 5.25 moles of copper are used, how many moles of oxygen must also be used?

$$? \text{ mol O}_2 = 5.25 \text{ mol Cu} \times \left(\frac{1 \text{ mol O}_2}{2 \text{ mol Cu}} \right) = 2.63 \text{ mol O}_2$$

- c. If 78.2 grams of oxygen react with copper, how many moles of copper (II) oxide will be produced?

$$? \text{ mol CuO} = 78.2 \text{ g O}_2 \times \left(\frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \right) \times \left(\frac{2 \text{ mol CuO}}{1 \text{ mol O}_2} \right) = 4.89 \text{ mol CuO}$$



	R	P
C	8	8
H	20	20
O	26	26

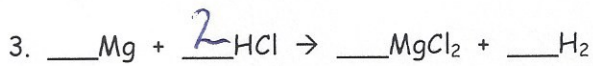
- a. How many moles of butane, C_4H_{10} , are needed to react with 5.5 moles of oxygen?

$$? \text{ mol C}_4\text{H}_{10} = 5.5 \text{ mol O}_2 \times \left(\frac{2 \text{ mol C}_4\text{H}_{10}}{13 \text{ mol O}_2} \right) = 0.85 \text{ mol C}_4\text{H}_{10}$$

- b. How many grams of carbon dioxide will be produced if 3.5 moles of O_2 react?

$$? \text{ g CO}_2 = 3.5 \text{ mol O}_2 \times \left(\frac{8 \text{ mol CO}_2}{13 \text{ mol O}_2} \right) \times \left(\frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} \right) = 94.8 \text{ g CO}_2 = 95 \text{ g CO}_2$$

$$\text{M.M. CO}_2 = 12.01 + 2(16) = 44.01 \text{ g/mol}$$



a. What mass of HCl is consumed by the reaction of 2.50 moles of magnesium?

$$? \text{ g HCl} = 2.50 \text{ mol Mg} \times \frac{24.31 \text{ g Mg}}{1 \text{ mol Mg}} \times \frac{2 \text{ mol HCl}}{1 \text{ mol Mg}} \times \frac{36.5 \text{ g HCl}}{1 \text{ mol HCl}} = 183 \text{ g HCl}$$

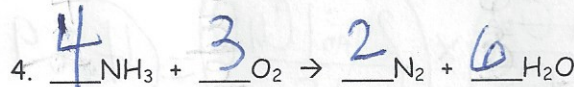
b. What mass of MgCl₂ is produced if 3.67 moles of HCl react?

$$? \text{ g MgCl}_2 = 3.67 \text{ mol HCl} \times \left(\frac{1 \text{ mol MgCl}_2}{2 \text{ mol HCl}} \right) \times \left(\frac{95.21 \text{ g MgCl}_2}{1 \text{ mol MgCl}_2} \right) = 174.7 = 175 \text{ grams MgCl}_2$$

M.M. MgCl₂ = 24.31 + 2(35.45) = 95.21 g/mol

c. How many moles of hydrogen gas are produced when 3.0 moles of magnesium react?

$$? \text{ mol H}_2 = 3.0 \text{ mol Mg} \times \left(\frac{1 \text{ mol H}_2}{1 \text{ mol Mg}} \right) = 3.0 \text{ mol H}_2$$



R	P
40	+2
24	
H	36
24	
O	24
36	

a. How many moles of oxygen react with 0.23 moles of NH₃?

$$? \text{ mol O}_2 = (0.23 \text{ mol NH}_3) \times \left(\frac{3 \text{ mol O}_2}{4 \text{ mol NH}_3} \right) = \frac{0.23 \times 3}{4} = 0.17 \text{ mol O}_2$$

b. How many grams of water will be produced if 0.55 moles of oxygen react?

$$? \text{ g H}_2\text{O} = 0.55 \text{ mol O}_2 \times \left(\frac{6 \text{ mol H}_2\text{O}}{3 \text{ mol O}_2} \right) \times \left(\frac{18 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right) = 19.8 \text{ g H}_2\text{O}$$

M.M. H₂O = 18 g/mol

c. How many moles of nitrogen gas will be produced if 12.6 grams of ammonia react?

$$? \text{ mol N}_2 = 12.6 \text{ g NH}_3 \times \left(\frac{1 \text{ mol NH}_3}{17.04 \text{ g NH}_3} \right) \times \left(\frac{2 \text{ mol N}_2}{4 \text{ mol NH}_3} \right) = \frac{12.6 \times 2}{17.04 \times 4} = 0.370 \text{ mol N}_2$$

M.M. NH₃ = 17.04 g/mol