

Stoichiometry Class Work

Part 1: Moles → Moles & Grams → Moles

1. According to the equation: $N_2 + 3H_2 \rightarrow 2NH_3$, how many moles of ammonia will be produced if 14.0 mol of hydrogen react with excess nitrogen?

$$\frac{14.0 \text{ mol } H_2}{3 \text{ mol } H_2} \times \frac{2 \text{ mol } NH_3}{1 \text{ mol } N_2} = 9.33 \text{ mol } NH_3$$

2. How many moles of sodium will react with water to produce 8.0 mol of hydrogen in the following reaction? $2Na + 2H_2O \rightarrow 2NaOH + H_2$

$$\frac{8.0 \text{ mol } H_2}{1 \text{ mol } H_2} \times \frac{2 \text{ mol } Na}{1 \text{ mol } H_2} = 16 \text{ mol } Na$$

3. How many mole of lithium chloride will be formed by the reaction of chlorine with 3.60 mol of lithium bromide in the following reaction?
 $2LiBr + Cl_2 \rightarrow 2LiCl + Br_2$

$$\frac{3.60 \text{ mol } LiBr}{2 \text{ mol } LiBr} \times \frac{2 \text{ mol } LiCl}{1 \text{ mol } Cl_2} = 3.60 \text{ mol } LiCl$$

4. How many moles of CO_2 and H_2O are formed from 7.26 mol of propane? $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

$$\frac{7.26 \text{ mol } C_3H_8}{1 \text{ mol } C_3H_8} \times \frac{3 \text{ mol } CO_2}{1 \text{ mol } C_3H_8} = 21.8 \text{ mol } CO_2$$

$$\frac{7.26 \text{ mol } C_3H_8}{1 \text{ mol } C_3H_8} \times \frac{4 \text{ mol } H_2O}{1 \text{ mol } C_3H_8} = 29.0 \text{ mol } H_2O$$

5. What mass of potassium chlorate is needed to produce 8.50 mol of oxygen? $2KClO_3 \rightarrow 2KCl + 3O_2$

$$\frac{8.50 \text{ mol } O_2}{3 \text{ mol } O_2} \times \frac{2 \text{ mol } KClO_3}{1 \text{ mol } KClO_3} \times 122.55 \text{ g } KClO_3 = 694 \text{ g } KClO_3$$

6. According to the equation: $N_2 + 3H_2 \rightarrow 2NH_3$, how many grams of ammonia will be produced if 14.0 mol of hydrogen react with excess nitrogen?

$$\frac{14.0 \text{ mol } H_2}{3 \text{ mol } H_2} \times \frac{2 \text{ mol } NH_3}{1 \text{ mol } N_2} \times 17.034 \text{ g } NH_3 = 159 \text{ g } NH_3$$

7. How many grams of sodium will react with water to produce 8.0 mol of hydrogen in the following reaction? $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

$$\frac{8.0 \text{ mol H}_2}{1 \text{ mol H}_2} \times \frac{2 \text{ mol Na}}{1 \text{ mol H}_2} \times \frac{22.99 \text{ g Na}}{1 \text{ mol Na}} = 370 \text{ g Na}$$

8. How many mole of lithium chloride will be formed by the reaction of chlorine with 36.0 grams of lithium bromide in the following reaction?
 $2\text{LiBr} + \text{Cl}_2 \rightarrow 2\text{LiCl} + \text{Br}_2$

$$\frac{36.0 \text{ g LiBr}}{86.84 \text{ g LiBr}} \times \frac{1 \text{ mol LiBr}}{2 \text{ mol LiBr}} \times \frac{2 \text{ mol LiCl}}{2 \text{ mol LiBr}} = 0.414 \text{ mol LiCl}$$

9. How many grams of CO_2 and H_2O are formed from 7.26 mol of propane?
 $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$

$$\frac{7.26 \text{ mol C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8} \times \frac{3 \text{ mol CO}_2}{1 \text{ mol C}_3\text{H}_8} \times \frac{44.01 \text{ g CO}_2}{1 \text{ mol CO}_2} = 959 \text{ g CO}_2$$

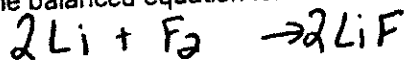
$$\frac{7.26 \text{ mol C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8} \times \frac{4 \text{ mol H}_2\text{O}}{1 \text{ mol C}_3\text{H}_8} \times \frac{18.016 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 523 \text{ g H}_2\text{O}$$

10. What mass of potassium chlorate is needed to produce 8.50 mol of oxygen? $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$

$$\frac{8.50 \text{ mol O}_2}{3 \text{ mol O}_2} \times \frac{2 \text{ mol KClO}_3}{1 \text{ mol KClO}_3} \times \frac{122.55 \text{ g KClO}_3}{1 \text{ mol KClO}_3} = 694 \text{ g KClO}_3$$

Part 2: grams → grams and all other two step Stoichiometry

1. Write the balanced equation for the reaction of lithium and fluorine.



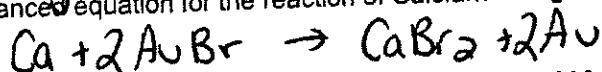
a. Calculate the mass of lithium required to produce 59.5 g of lithium fluoride.

59.5g LiF		1 mol LiF		2 mol Li		6.941 g Li	= 15.9 g Li
		25.941 g LiF		2 mol LiF		1 mol Li	

b. How many grams of lithium fluoride can be produced from 300.0 g of fluorine?

300.0g F ₂		1 mol F ₂		2 mol LiF		25.941 g LiF	= 409.6 g LiF
		38.00 g F ₂		1 mol F ₂		1 mol LiF	

2. Write the balanced equation for the reaction of Calcium with gold (I) bromide.



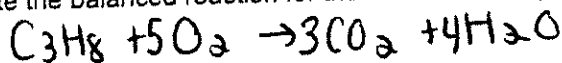
a. How many grams of calcium are required to produce 200.0 g of gold?

200.0g Au		1 mol Au		1 mol Ca		40.08 g Ca	= 20.35 g Ca
		196.97 g Au		2 mol Au		1 mol Ca	

b. How many grams of calcium bromide can be produced when 350.0 g of gold (I) bromide react?

350.0g AuBr		1 mol AuBr		1 mol CaBr ₂		199.88 g CaBr ₂	= 126.3 g CaBr ₂
		276.87 g AuBr		2 mol AuBr		1 mol CaBr ₂	

3. Write the balanced reaction for the combustion of propane (C₃H₈).



a. Calculate the mass of each product produced when 180.0 g of propane react.

180.0g C ₃ H ₈		1 mol C ₃ H ₈		3 mol CO ₂		44.01 g CO ₂	= 539.0 g CO ₂
		44.044 g C ₃ H ₈		1 mol C ₃ H ₈		1 mol CO ₂	

180.0g C ₃ H ₈		1 mol C ₃ H ₈		4 mol H ₂ O		18.016 g H ₂ O	= 244.2 g H ₂ O
		44.044 g C ₃ H ₈		1 mol C ₃ H ₈		1 mol H ₂ O	

b. How many liters of oxygen are required to react with 99.0 g of propane?

99.0g C ₃ H ₈		1 mol C ₃ H ₈		5 mol O ₂		22.4 L O ₂
		44.044 g C ₃ H ₈		1 mol C ₃ H ₈		1 mol O ₂

= 251 L O₂

