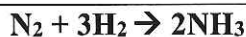


Mastering Stoichiometry

(Honors Chemistry)

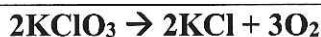
Write and balance the equation, then answer the question. Show all work using dimensional analysis. All answers should be in scientific notation with the correct number of significant digits.



1. How many moles of hydrogen gas are needed to produce 6.37 moles of nitrogen trihydride when reacting with nitrogen gas?

$$\frac{6.37 \text{ mol NH}_3}{2 \text{ mol NH}_3} \times \frac{3 \text{ mol H}_2}{1 \text{ mol N}_2}$$

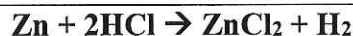
$$9.56 \text{ mol H}_2$$



2. How many grams of oxygen gas are produced when 3.675×10^2 grams of solid potassium chlorate decomposes into solid potassium chloride and oxygen gas?

$$\frac{3.675 \times 10^2 \text{ g KClO}_3}{122.5 \text{ g}} \times \frac{1 \text{ mol KClO}_3}{2 \text{ mol KClO}_3} \times \frac{3 \text{ mol O}_2}{1 \text{ mol O}_2} \times 32 \text{ g}$$

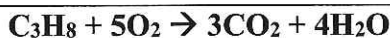
$$1.440 \times 10^2 \text{ g O}_2$$



3. How many grams of zinc chloride are produced when zinc reacts with 2.96×10^5 grams of hydrochloric acid in a single replacement reaction?

$$\frac{2.96 \times 10^5 \text{ g HCl}}{36.5 \text{ g}} \times \frac{1 \text{ mol HCl}}{2 \text{ mol HCl}} \times \frac{1 \text{ mol ZnCl}_2}{1 \text{ mol ZnCl}_2} \times 136 \text{ g}$$

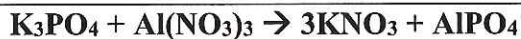
$$5.51 \times 10^5 \text{ g ZnCl}_2$$



4. How many molecules of carbon dioxide are produced from the combustion 4.65 moles of oxygen reacting with an excess of tricarbon octahydride?

$$\frac{4.65 \text{ mol O}_2}{5 \text{ mol O}_2} \times \frac{3 \text{ mol CO}_2}{1 \text{ mol CO}_2} \times 6.02 \times 10^{23} \text{ molecules}$$

$$1.68 \times 10^{24} \text{ molecules CO}_2$$



5. How many formula units of potassium nitrate are produced from 6.98×10^{14} grams of aluminum nitrate reacting with potassium phosphate in a double replacement reaction?

6.98×10^{14} -g $\text{Al}(\text{NO}_3)_3$	1 mol $\text{Al}(\text{NO}_3)_3$	3 mol KNO_3	6.02×10^{23} FU KNO_3
	213-g	1 mol $\text{Al}(\text{NO}_3)_3$	1 mol KNO_3

$$5.92 \times 10^{36} \text{ FU } \text{KNO}_3$$



6. When reacting with an excess of Iron (II) sulfide in a double replacement reaction, how many moles of hydrochloric acid are needed to produce 3.64×10^{27} formula units of iron (II) chloride?

3.64×10^{27} FU FeCl_2	1 mol FeCl_2	2 mol HCl
	6.02×10^{23} FU	1 mol FeCl_2

$$1.21 \times 10^4 \text{ moles HCl}$$



7. Iron (III) oxide and hydrogen gas are produced when iron metal reacts with water. How many grams of iron (III) oxide can be produced from 4.51×10^{29} atoms of iron at STP?

4.51×10^{29} atoms Fe	1 mol Fe	2 mol Fe_2O_3	160-g
	6.02×10^{23} atoms	2 mol Fe	1 mol Fe_2O_3

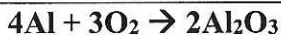
$$5.99 \times 10^7 \text{ g } \text{Fe}_2\text{O}_3$$



8. How many liters of hydrogen gas, at STP, are produced when 2.34×10^{12} grams of sodium reacts with phosphoric acid in a single replacement reaction?

2.34×10^{12} g Na	1 mol Na	3 mol H_2	22.4-L
	23-g	6 mol Na	1 mol H_2

$$1.14 \times 10^{12} \text{ - L } \text{H}_2$$



9. At STP, how many grams aluminum are needed to react with 4.95×10^{14} liters of oxygen gas in a combination reaction?

4.95×10^{14} -L O_2	1 mol O_2	4 mol Al	27-g
	22.4-L	3 mol O_2	1 mol Al

$$7.96 \times 10^{14} \text{ g Al}$$