3. Magnesium undergoes a single displacement reaction with hydrochloric acid.

Balanced Equation:

$2Mg + 2HCl \rightarrow 2MgCl + H_2$

How many grams of hydrogen gas will be produced from the reaction of 3.00 g of magnesium with 4.00 g of hydrochloric acid?

$3.0\text{ g of Mg} \times \frac{1\text{ mol}}{24.31\text{ g of Mg}} = 0.123\text{ mol of Mg} \times \frac{2\text{ mol HCl}}{2\text{ mol Mg}} = 0.123\text{ of HCl}$

$4.0\text{ g of HCl} \times \frac{1\text{ mol}}{36\text{ g HCl}} = 0.11\text{ mol HCl} \times \frac{2\text{ mol Mg}}{2\text{ mol HCl}} = 0.11\text{ mol of Mg}$

	Mg	HCl
Have	0.123	0.11
Need	0.11	0.123
	+	−

$0.11\text{ mol of HCl} \times \frac{1\text{ mol } H_2}{2\text{ mol HCl}} = 0.056\text{ mol } H_2$

$0.056\text{ mol } H_2 \times \frac{2\text{ g}}{1\text{ mol}} = 0.11\text{ g of } H_2$

Identify the limiting and excess reactants.

L.R = HCl Ex = Mg

4. Sulfur reacts with oxygen to produce sulfur trioxide gas.

Balanced Equation:

$2S + 3O_2 \rightarrow 2SO_3$

If 6.3 g of sulfur reacts with 10.0 g of oxygen, what is the limiting reactant?

$6.3\text{ g of S} \times \frac{1\text{ mol}}{32.065\text{ g}} = 0.19\text{ mol of S} \times \frac{3\text{ mol } O_2}{2\text{ mol S}} = 0.285\text{ mol } O_2$

$10.0\text{ g of } O_2 \times \frac{1\text{ mol}}{32.00\text{ g}} = 0.313\text{ mol of } O_2 \times \frac{2\text{ mol S}}{3\text{ mol } O_2} = 0.209\text{ mol S}$

	S	O_2
H	0.19	0.313
N	0.285	0.209
	−	+

L.R

How many grams of sulfur trioxide will be produced?

$0.19\text{ mol of S} \times \frac{2\text{ mol } SO_3}{2\text{ mol S}} = 0.19\text{ mol } SO_3 \times \frac{80\text{ g}}{1\text{ mol}} = 15.2\text{ g of } SO_3$