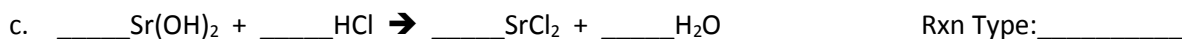
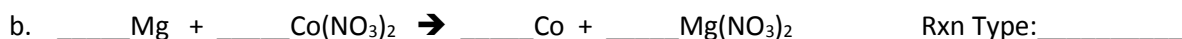


1. Balance and determine the reaction type:



2. $2 \text{Na} + \text{Cl}_2 \rightarrow 2 \text{NaCl} \quad \Delta H = -411.12 \text{ kJ}$

a. Is the reaction endothermic or exothermic?

b. How many grams of chlorine gas is needed to produce 0.75 moles of sodium chloride?

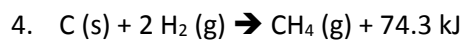
c. How many particles of NaCl will be produced when 35 grams of Na reacts with excess chlorine?

3. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2 \quad \Delta H = +176.8 \text{ kJ}$

a. Is the reaction endothermic or exothermic?

b. How many liters of carbon dioxide are produced at STP when 25.0 g of calcium carbonate decompose?

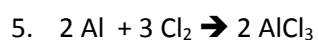
c. How many grams of CaCO₃ are required to produce 4.11 grams of CaO?



- a. Is the reaction endothermic or exothermic?
- b. How many liters of CH_4 will be produced when 31 grams of carbon react with excess hydrogen at STP?

c. How many grams of carbon are required to react with 4.22×10^{24} molecules of H_2 ?

d. 55 liters of H_2 at STP react with excess carbon. How many moles of CH_4 will be produced?



Aluminum reacts with chlorine to produce aluminum chloride according to the equation above. 4.25×10^{22} atoms of aluminum are mixed with 18.23 grams of chlorine gas and allowed to react.

- a. What is the limiting reactant?
- b. What is the excess reactant?
- c. How many grams of the excess reactant remain after the reaction?
- d. What is the maximum mass (theoretical yield) of aluminum chloride that will be made?
- e. What is the percent yield if 7.48 g of aluminum chloride is produced in lab?