6.5 Synthesis and Decomposition Reactions  
Pg. 237 – 239

**Synthesis Reactions**
- In a **synthesis reaction**, two simple reactants combine to make a larger or more complex product.
- They follow the general pattern: \( A + B \rightarrow AB \)
- E.g. Powdered zinc metal reacts with sulfur to produce zinc sulfide powder.  
\[ \text{Zn (s)} + \text{S (s)} \rightarrow \text{ZnS (s)} \]
- E.g. A small piece of sodium metal ignites as it is placed in a flask of chlorine gas.  
\[ 2 \text{Na (s)} + \text{Cl}_2 (g) \rightarrow 2 \text{NaCl (s)} \]
- E.g. Hydrogen chloride gas and ammonia gas both diffuse out of their aqueous solutions, and react when they come into contact to produce a cloudy white powder of ammonium chloride.  
\[ \text{HCl (g)} + \text{NH}_3 (g) \rightarrow \text{NH}_4\text{Cl (s)} \]

**Decomposition Reactions**
- During a **decomposition reaction**, large compounds are broken down into smaller compounds or elements.
- They follow the general pattern: \( AB \rightarrow A + B \)
- These reactions usually absorb energy (such as thermal or electrical energy) from an external source.
  - This energy is then used to convert reactants into products.
- E.g. Energy + water \( \rightarrow \) hydrogen and oxygen.  
\[ \text{Energy} + 2 \text{H}_2\text{O (l)} \rightarrow 2 \text{H}_2 (g) + \text{O}_2 (g) \]
- E.g. Energy (electricity) + sodium azide \( \rightarrow \) sodium + nitrogen.  
- This is how airbags work!  
\[ \text{Energy} + 2 \text{NaN}_3 (s) \rightarrow 2 \text{Na (s)} + 3 \text{N}_2 (g) \]

**Homework**
- Read 6.5 Synthesis and Decomposition Reactions, Pg. 237 – 239
- Pg. 239 #1, 2, 4

**Applied**
- Read 6.5 Types of Chemical Reactions, Pg. 222
- Pg. 239 #1, 2 (SNC2D Textbook)