**Unit 3: Basic Chemistry**

**Content Outline: Chemical Reactions (3.4)**

1. *Types* of Chemical Reactions
   1. **Synthesis** – Direct *combination* of elements
      1. Element/compound + element/compound 🡪 One compound
      2. A + B 🡪 AB
      3. 2Mg +O2 🡪 2MgO
   2. **Decomposition** – *Breakdown* of a compound
      1. One Compound 🡪 Element/compound + element/compound
      2. AB 🡪 A + B
      3. CuCO3 🡪 CuO + 02
   3. **Single Replacement** – the more reactive element *replaces* the least reactive in a compound.
      1. Element + compound 🡪 Compound + element
      2. A + BC 🡪 AC + B
      3. Cu + Fe(NO3)2 🡪 Cu(NO3)2 + Fe
   4. **Double Replacement** – *Exchange* of ions on each compound
      1. Compound + Compound 🡪 Compound + Compound
      2. AB + CD 🡪 AD + CB
      3. HCl + NaOH 🡪 NaCl + H2O
   5. **Combustion** – A combustion reaction is when *oxygen* combines with another compound to *form* *water and carbon dioxide*. These reactions are **exothermic**, meaning they *produce heat*.
      1. Element + Oxygen 🡪 water + carbon dioxide
      2. C10H8 + 12 O2 ---> 10 CO2 + 4 H2O
2. **Exothermic Reactions** - the word describes a process that *releases energy* in the form of heat. Forming a chemical bond releases energy and therefore is an exothermic process. Exothermic reactions usually feel hot because it is giving heat to you.
3. **Endothermic Reactions** - a process or reaction that *absorbs energy* in the form of heat. Breaking a chemical bond requires energy and therefore is Endothermic. Endothermic reactions usually feel cold because it is taking heat away from you.

Examples of Endothermic and Exothermic Processes and Reactions

