Energy Changes in Chemical Reactions

- Objective
- ***To able to define an endothermic and exothermic reaction.***

Energy Changes in Chemical Reactions

- Objective
- To able to use the concept of ***energy in bond breaking*** and ***bond making*** to explain why one reaction can be endothermic and another reaction can be exothermic.

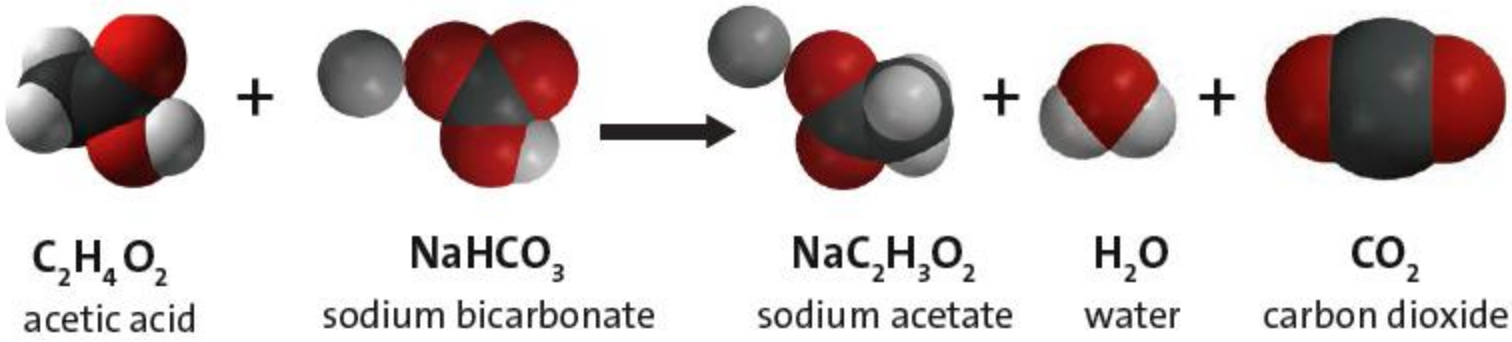
Demonstration

- Thermite Reaction
- Nitrogen Triiodide Reaction
- White Phosphorous Reaction

Activity

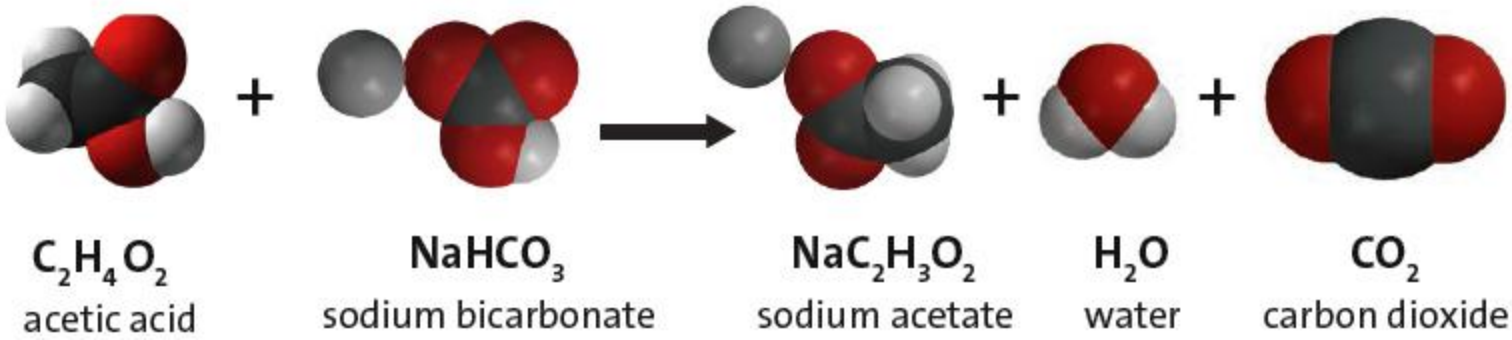
- Complete the Activity and answer the questions on the activity sheet.
- 15 minutes

Explain it with Atoms and Molecules



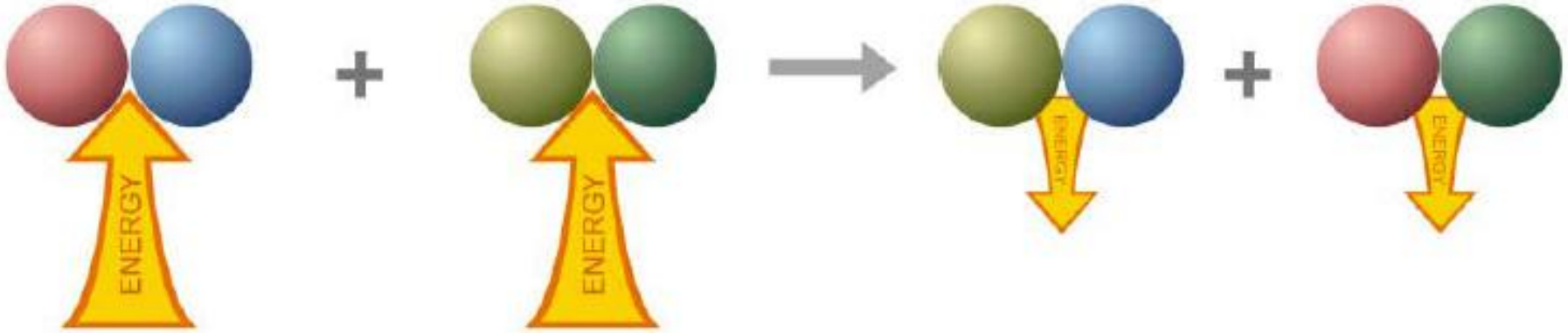
- Is this an endothermic or exothermic reaction?
- Endothermic

Explain it with Atoms and Molecules

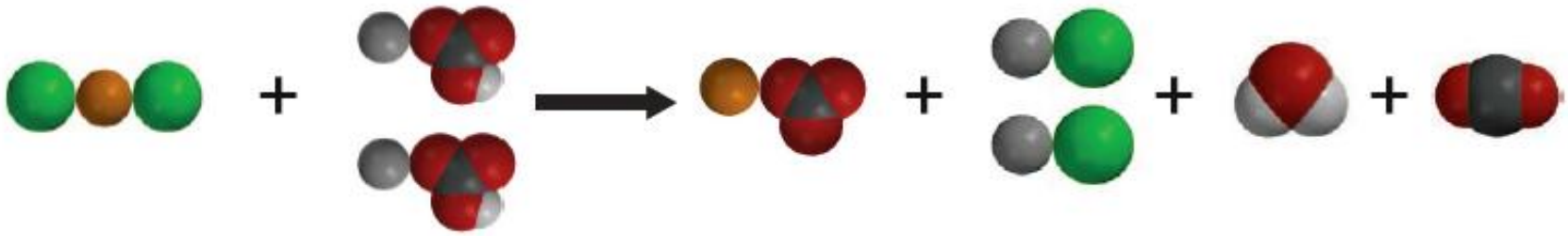


- What do the arrows show about the amount of energy required to break the bonds of the reactants compared to the amount of energy released when the products are formed?
- It took more energy to break the bonds of the reactants than was released when the bonds in the products were formed.

Endothermic Reaction



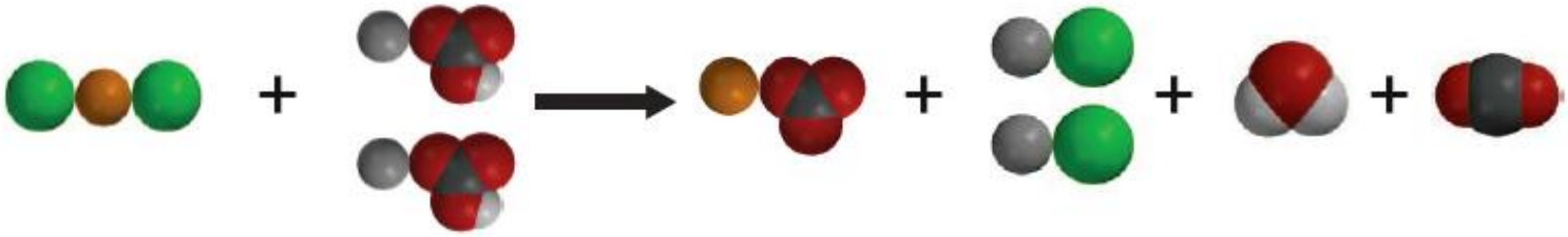
Explain it with Atoms and Molecules



$CaCl_2$	$2NaHCO_3$	$CaCO_3$	$2NaCl$	H_2O	CO_2
calcium chloride	sodium bicarbonate	calcium carbonate	sodium chloride	water	carbon dioxide

- Is this an endothermic or exothermic reaction?
- Exothermic

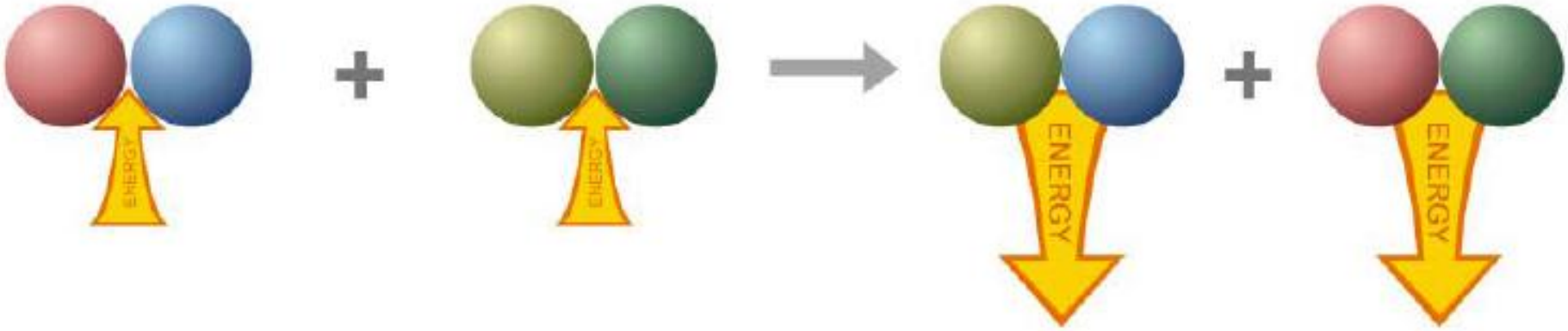
Explain it with Atoms and Molecules



$CaCl_2$ calcium chloride + $2NaHCO_3$ sodium bicarbonate → $CaCO_3$ calcium carbonate + $2NaCl$ sodium chloride + H_2O water + CO_2 carbon dioxide

- What do the arrows show about the amount of energy required to break the bonds of the reactants compared to the amount of energy released when the products are formed?
- More energy was released when the bonds in the products were formed that was required to break the bonds in the reactants.

Exothermic Reaction



Key Concepts

- If two substances react and the temperature of the mixture decreases, the reaction is ***endothermic.***
- If two substances react and the temperature of the mixture increases, the reaction is ***exothermic.***
- A chemical reaction involves the ***breaking of bonds*** in the ***reactants*** and the ***forming of bonds*** in the ***products.***

Key Concepts

- It takes ***energy*** to break bonds.
- Energy is ***released*** when bonds are ***formed.***
- If a reaction is endothermic, ***it takes more energy to break the bonds of the reactants*** than is released when the bonds of the products are formed.
- If a reaction is exothermic, ***more energy is released when the bonds of the products are formed*** than it takes to break the bonds of the reactants.