An Intro to Enthalpy

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Physical change- change in size, shape or state of matter



Chemical Reaction - process in which one or more substances are changed into others. Chemical reactions are accompanied by a loss or gain of energy.



Chemical Change

- Precipitate formation (2 liquids form a solid)
- Color change (sometimes is physical)
- Gas formation
- Change in pH
- Release or absorption of Energy

Background

Heat- transfer of energy (release or absorption of energy)





Endothermic and exothermic reactions

Step 1: Energy must be SUPPLIED to break chemical bonds:

Step 2: Energy is RELEASED when new chemical bonds are made:



A reaction is EXOTHERMIC if more energy is RELEASED than SUPPLIED. If more energy is SUPPLIED than is RELEASED then the reaction is ENDOTHERMIC

Activation Energy

• All reactions have an energy profile:



- Activation energy is the amount of energy that something required in order to <u>activate</u> a reaction.
- This can be changed by several factors, we will talk more about this later in the semester.

Discussing Enthalpy Change

 When we discuss change in enthalpy (ΔH) we talk about the system and the surroundings.

• <u>Ex</u>othermic: Heat energy is <u>ex</u>iting the system into the surroundings. - ΔH

<u>Endothermic</u>: Heat energy is <u>entering</u> the system from the surroundings. +ΔH

Exothermic-heat energy EXITS the system

- ex. Combustion, evaporation of water
- surroundings usually feel warmer



Endothermic-heat energy ENTERS the system

- ex. Cold packs, melting ice
- surroundings usually feel cooler



How do cold packs work?



The outer pouch contains water. The inner pouch contains **ammonium-nitrate.**

When you "pop" the inner pouch, the chemical reaction absorbs heat energy from the surroundings. This is an endothermic reaction.

The temperature of the solution falls to about 35 F for 10 to 15 minutes.

True or False

Chemical reactions always produce heat

Chemical reactions can release or absorb heat, but can also create light, sound or electricity!



True or False

Heat can be lost, destroyed or just disappear

Heat energy is transferred from one object to another, or is transferred to another form of energy, but never disappears.

Law of Conservation of Energy

True or False

Color change is always a physical property

Color is a physical property.

Color change can be the result of a chemical change.



