

Thermochemistry

Energy

- Energy – the ability to do _____ or produce _____
- Exists in 2 forms:
 - Kinetic energy – energy of _____
 - Potential energy – energy at _____ or energy of _____

Energy

- **Kinetic energy** – in a chemical reaction _____ is the determining factor
- The higher the temperature...the _____ the particles move...the _____ the kinetic energy
- **Potential energy** – in a chemical reaction deals with the types of atoms & what bonds the form

Law of Conservation of Energy

- **Law of Conservation of Energy** – Energy is neither _____ nor _____

Heat (q)

- Heat or energy can be in joules, calories, kilocalories, or kilojoules
- The SI unit is the _____
- 1 cal = 1000 Cal
- 1 cal = 4.18 J

Specific Heat

- _____ (c) – the amount of heat required to raise 1 gram of a substance by 1°C
- Specific heat is an _____ property
- Every substance has its own specific heat

Specific Heat

- $q = mc\Delta T$
- q = heat (J)
- m = mass (g)
- c = specific heat (J/g°C)
- ΔT = change in temperature = $T_f - T_i$ (°C)

Specific Heat

- A 10.0 g sample of iron changes temperature from 25.0°C to 50.4 °C while releasing 114 joules of heat. Calculate the specific heat of iron.

Another example

- If the temperature of 34.4 g of ethanol increases from 25.0 °C to 78.8 °C how much heat will be absorbed if the specific heat of the ethanol is 2.44 J/g °C

Yet another example

- 4.50 g of a gold nugget absorbs 276 J of heat. What is the final temperature of the gold if the initial temperature was 25.0 °C & the specific heat of the gold is 0.129J/g °C

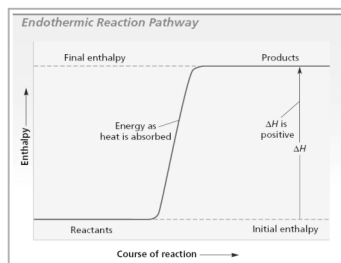
Endothermic & Exothermic Reactions

- **Endothermic reactions** – chemical reaction that requires energy to break existing bonds
 - Heat goes _____ the reaction from the surroundings
- **Exothermic reactions** – chemical reaction in which energy is released
 - Heat goes _____ of the reaction into the surroundings

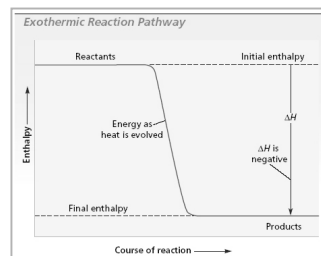
Endothermic & Exothermic Reactions

- **Endothermic reactions** – since heat goes from the surroundings into your system, it will feel _____
 - Temperature of endothermic reactions goes _____
 - The sign for the heat change will be _____
- **Exothermic reactions** – since heat goes from the system to the surroundings, it will feel _____
 - Temperature of exothermic reactions goes _____
 - The sign for the heat change will be _____

Endothermic & Exothermic Reactions



Endothermic & Exothermic Reactions



Endothermic & Exothermic Reactions

- Are the following reactions endothermic or exothermic?
- $\text{CO} + 3\text{H}_2 \rightarrow \text{CH}_4 + \text{H}_2\text{O}$ $\Delta H = -206\text{kJ}$

- I add magnesium metal to some hydrochloric acid. The temperature goes from 23°C to 27°C

- I mix together some vinegar & baking soda. The temperature goes from 28°C to 23°C