

ENERGY CHANGES IN CHEMICAL REACTIONS

- Molecules are held together by **CHEMICAL BONDS**.
- In order to break a bond, energy must be added to the bond.
- When bonds form, energy is released.

Classifying Reactions:

- Can classify reactions based on their energy changes.
 - Whether they take in or release energy (usually as heat)
- If a reaction takes in MORE energy to break bonds than it GIVES OFF to form bonds, the reaction will require a NET INPUT OF ENERGY, and it is called...

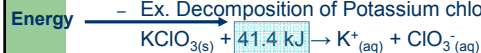
ENDOTHERMIC



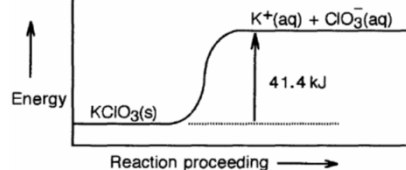
Endothermic Reactions



- An **ENDOTHERMIC** reaction **ABSORBS** heat from its surroundings (heat **Enters** the system).
 - ∴ feels cold
 - Ex. Decomposition of Potassium chlorate

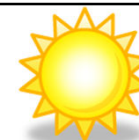


- Graphically represented as:



- If a reaction takes in LESS energy to break bonds than it GIVES OFF to form bonds, the reaction will GIVE OFF ENERGY, and it is classified as...

EXOTHERMIC



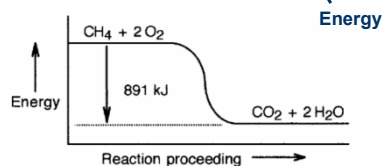
Exothermic Reactions:



- An **Exothermic** reaction **GIVES OFF** heat to the surroundings (heat **exits** the reaction)
 - ∴ it feels warm
 - Ex. Your furnace burning natural gas.



Graphically represented as:



Enthalpy (heat energy):

- Is the heat contained in the system
 - Symbol = H
- The change in heat (enthalpy) during a reaction is ΔH
 - $\Delta H = H_{\text{PRODUCTS}} - H_{\text{REACTANTS}}$
- Where:
 - H_{PRODUCTS} = the heat contained in the PRODUCTS
 - $H_{\text{REACTANTS}}$ = the heat contained in the REACTANTS

Writing the Energy Term (Enthalpy)

- Exothermic and endothermic reactions can each be shown in two ways:

- **ENDOTHERMIC:**



- **EXOTHERMIC:**



Note:

ΔH is +ve for an endothermic reaction

And

ΔH is -ve for an exothermic reaction