# 10%
# Chemical Energetics
## *Session 1*

Migma Tshering

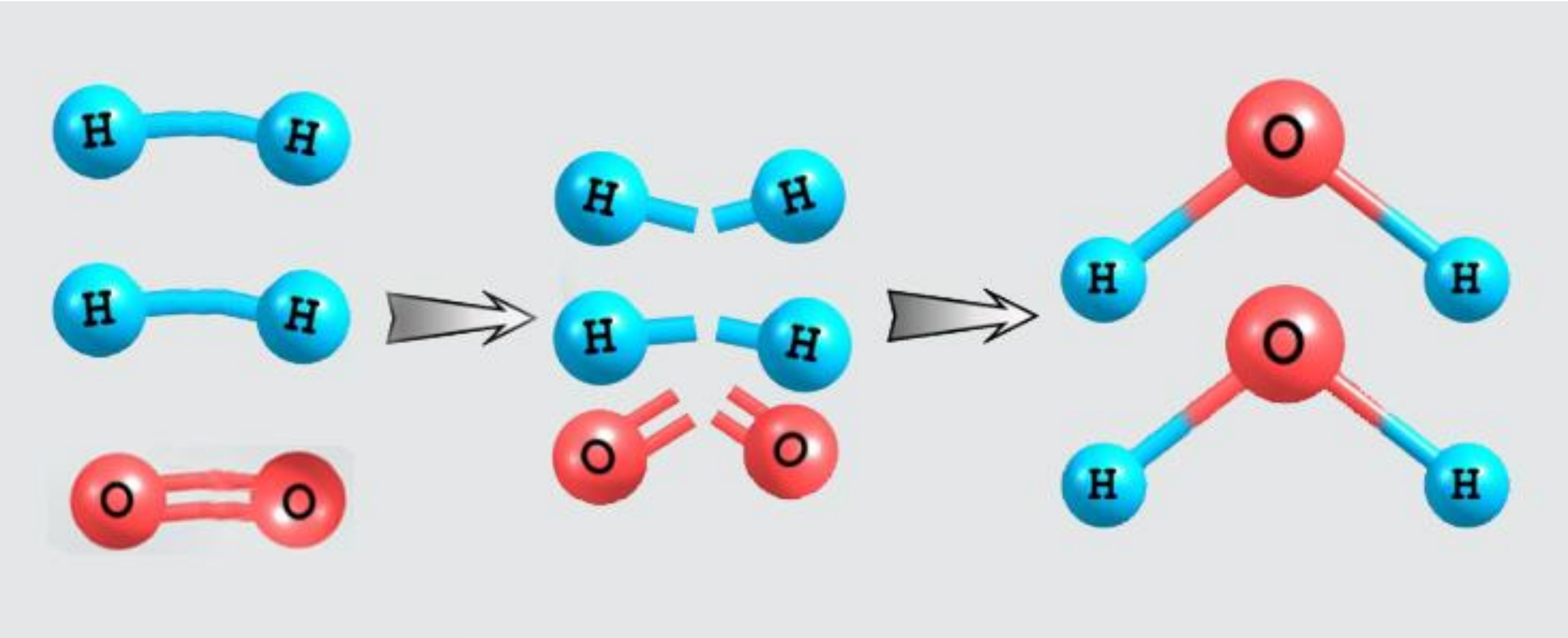
# Learning Objectives

- **Internal Energy (E)**
- **Enthalpy (H)**
  - ***Definition***



Source: Le Monde

Source: Peakpx

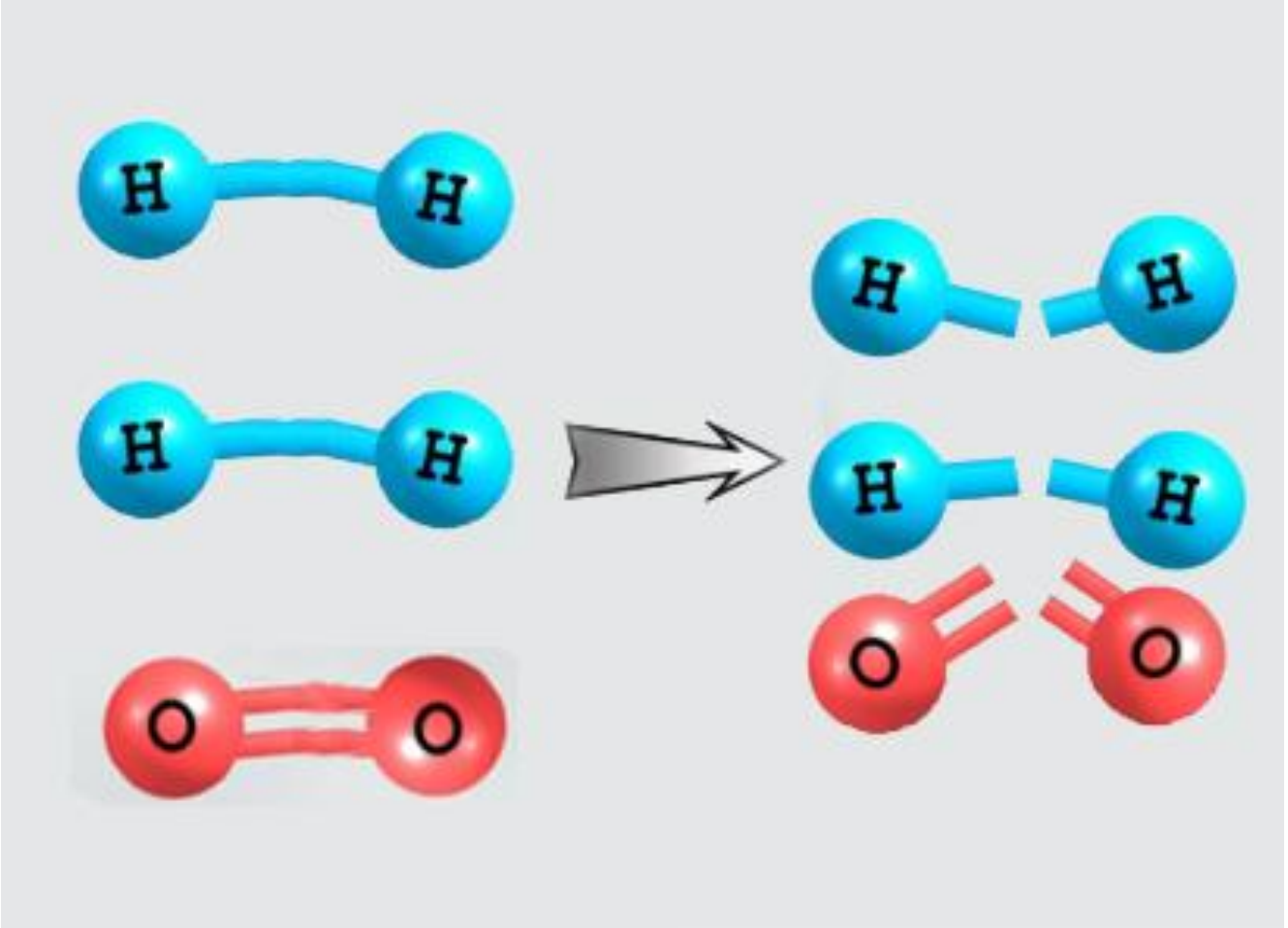



Source: Study.com

# Introduction

Energy is needed

to BREAK a chemical bond.

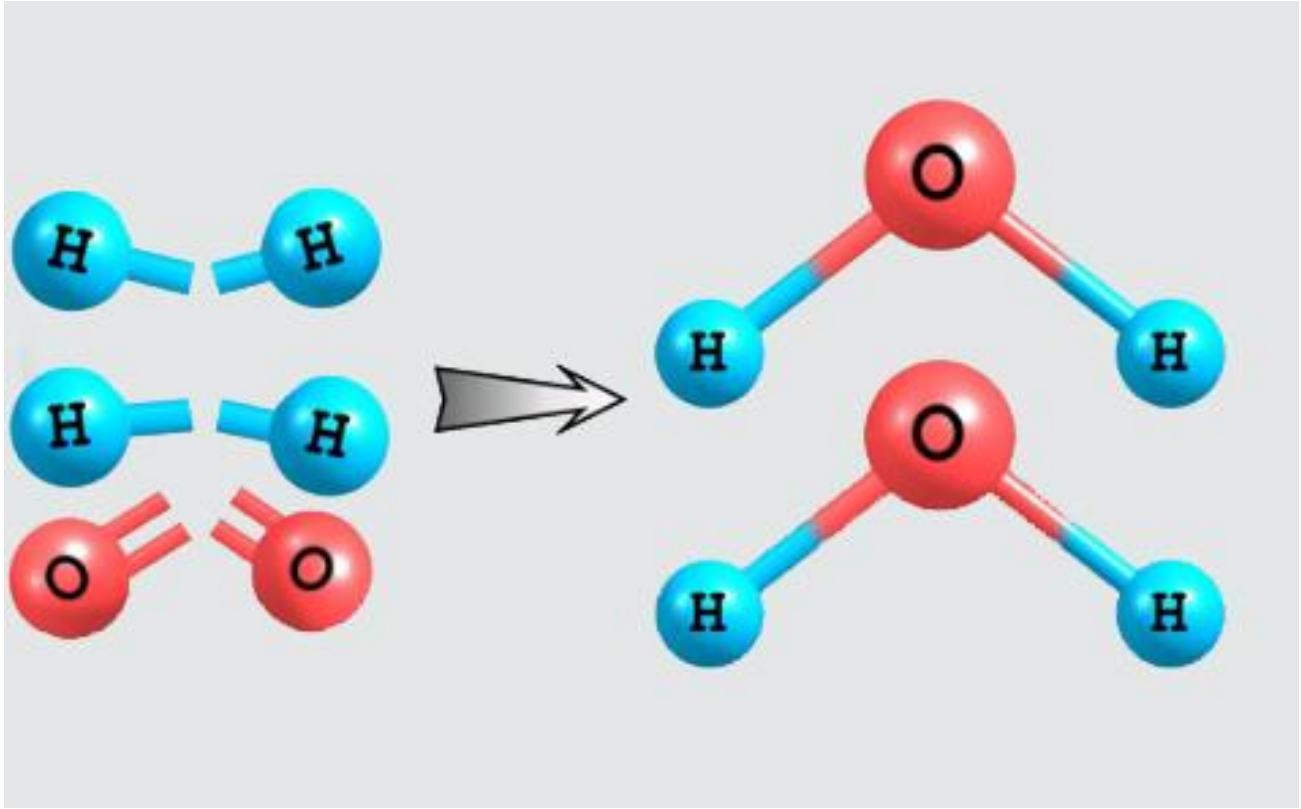



Source: Study.com

# Introduction

**Energy is released**

**when a bond is FORMED.**




Source: Study.com

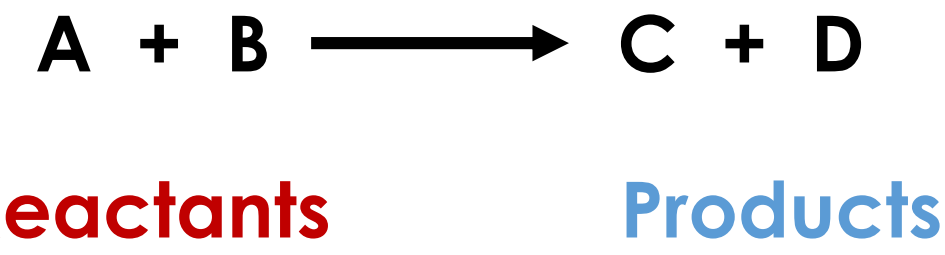
# Introduction

***All the chemical reactions are accompanied by energy change***

- **Internal Energy (E)**
- **Enthalpy (H)**

} ***Helps Explains Energy***

# Chemical Equation



# Internal Energy (E)

- **The energy stored in a substance.**

# Internal Energy (E)


**Reactants** **Products**

$E_R$

Internal Energy of the Reactants

$E_P$

Internal Energy of the Products

# Change in Internal Energy (ΔE)

$$\Delta E = E_P - E_R$$

**Change in Internal Energy** = **Internal Energy of Products** - **Internal Energy of Reactants**

# Change in Internal Energy (ΔE)

$$\Delta E = E_P - E_R$$

## Example:

$$A + B \longrightarrow C + D$$

$E_R = 50$ $\qquad$ $E_P = 100$

Energy is absorbed

According to the above formula,


$\Delta E = E_P - E_R$

$\Delta E = 100 - 50$

$\Delta E = 50$ or $+50$

$\Delta E =$ POSITIVE

$\Delta E =$ Positive

$E_P > E_R$



Source: Linseis Messgerate GmbH

# Change in Internal Energy (ΔE)

$$\Delta E = E_P - E_R$$

## Example:

$$A + B \longrightarrow C + D$$

$$E_R = 150 \qquad E_P = 100$$

Energy is rereleased

According to the above formula,


$$\Delta E = E_P - E_R$$

$$\Delta E = 100 - 150$$

$$\Delta E = -50$$

$$\Delta E = \text{NEGATIVE}$$

$$\Delta E = \text{Negative}$$

$$E_P < E_R$$



Source: Linseis Messgerate GmbH

# Change in Internal Energy (ΔE)

- **Endothermic Reaction**

$$\Delta E = \text{Positive}$$

$$E_P > E_R$$

- **Exothermic Reaction**

$$\Delta E = \text{Negative}$$

$$E_P < E_R$$

# Enthalpy (H):

# Energy that can be converted to heat