The Heat of Chemical Reactions:

Enthalpy of a reaction or **energy change of a reaction** ΔH *(also called the heat of reaction)*, is the amount of energy or heat absorbed in a reaction. If the energy is required, ΔH is positive, and if energy is released, the ΔH, is negative.

A common chemical reaction written as a thermochemical equation;

$$2H_2 + O_2 \rightleftharpoons 2H_2O + 483.6\ kJ$$

Coefficients stand for moles only in these equations.

$$H_2 + 1/2\ O_2 \rightleftharpoons H_2O + 241.8\ kJ$$

ΔH is actually called the change in enthalpy which is equal to the amount of heat lost or gained by the system during a process at constant pressure.

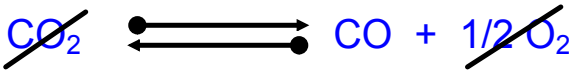
for the common reaction $2H_2 + O_2 \rightleftharpoons 2H_2O$
ΔH = -486.3 kJ/mol (exothermic)

we can also write the equation in reverse order
$2H_2O \rightleftharpoons 2H_2 + O_2$ and ΔH = 486.3 kJ/mol (endothermic)

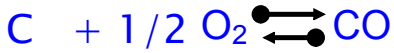
Heat of formation: the amount of heat released or absorbed to form 1.0 mole of a compound from it elements. ΔH_f = -241.8 kJ/mol is called the standard heat of formation.

Hess's Law: The sum enthalpy change for a reaction is equal to sum of each steps enthalpy change.

$\Delta H_f = -394$ kJ



$\Delta H_f = +283$ kJ



$\Delta H_f = -111$ kJ

Reaction Rate Expression:

$wA + xB = yC + zD$

Forward Reaction Rate = $K_f [C]^y[D]^z$
Reverse Reaction Rate = $K_R[A]^w[B]^x$

$2HCl + Ca(OH)_2 = CaCl_2 + 2HOH$
Forward Reaction Rate = $K_f [CaCl_2][HOH]^2$
Reverse Reaction Rate = $K_R[HCl]^2[Ca(OH)_2]$

$Al(OH)_3 + CaI_2 =$