



Chemistry coverage



Done By Hyklin

@11A Dreamers

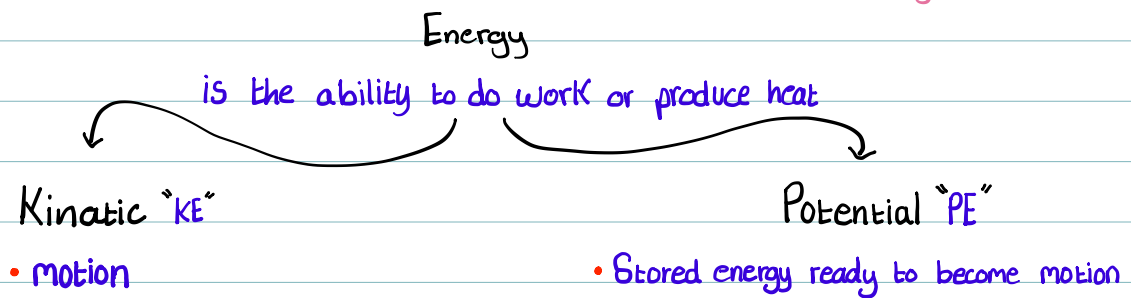
دعاء قبل المذاكرة

اللهم اني اسألك فهم النبيين، وحفظ المرسلين، والملائكة المقربين. اللهم اجعل لسانني
عامر بذكرك وقلبي بخشيتك وأسراري بطاعتك انك على كل شيء قدير.
اللهم إني أسألك ان تعينني في دراستي وأن تسهل علي مذاكرتي وان ترزقني قوة
الحفظ وتجعلها ميسرة علي ليست شاقة ولا صعبة.

Energy :-

11A Chemistry inspier, Term 1

By - HyKlin

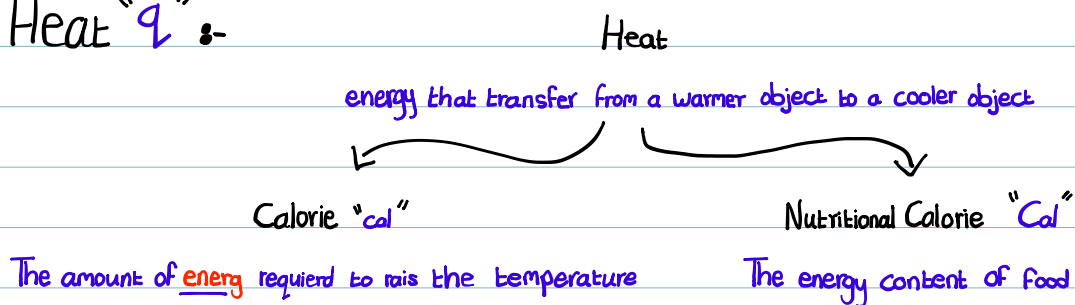


The nature of Energy :-

law of conservation of energy: energy is neither created nor destroyed in any chemical reaction or physical process.

Chemical potential energy : is energy stored in substance because of its composition

Heat "q" :-



$1 \text{ Cal} = 1 \text{ Kcal} = 1000 \text{ cal}$			
J	→ cal	cal	→ Cal
	$\times 0.239$	$\div 1000$	Kcal
cal	→ J	Cal	→ cal
	$\times 4.184$	Kcal	$\times 1000$

Specific Heat "C" :-

Specific heat : is the amount of heat required to raise the temperature

Equation for Calculating:-

$$q = c \times m \times \Delta T \longrightarrow (T_f - T_i)$$

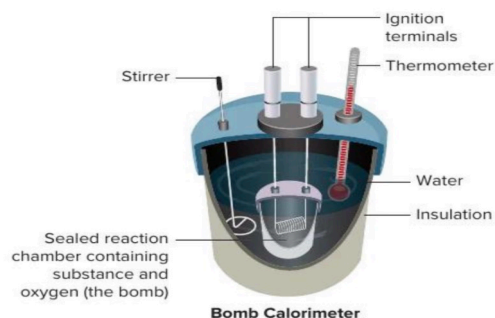
Heat Specific heat mass Temperature

$$J = \text{J/g} \cdot ^\circ\text{C} \times g \times ^\circ\text{C}$$

Heat :-

Calorimeter : is an insulated device used for measuring the amount of heat absorbed or released

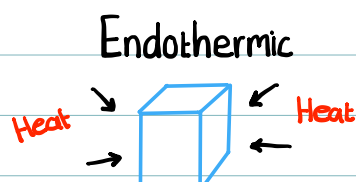
- You can use calorimeter to determine the "C" of unknown metal



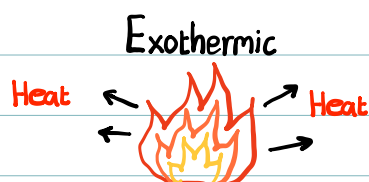
Chemical Energy and the Universe :-

Thermochemistry : The study of heat change

Universe = System + Surroundings



- The endothermic reaction is cooler than surroundings
- $\Delta H > 0$



- The exothermic reaction is hotter than surroundings
- $\Delta H < 0$

Enthalpy "H" :-

- is the heat content of a system at a constant.

Note :-

you cannot measure the actual energy or enthalpy.

Enthalpy (heat) of reaction : is the change in enthalpy during a reaction.

- Symbolized as " ΔH_{rxn} "

$$\Delta H_{rxn} = H_{products} - H_{reactants}$$

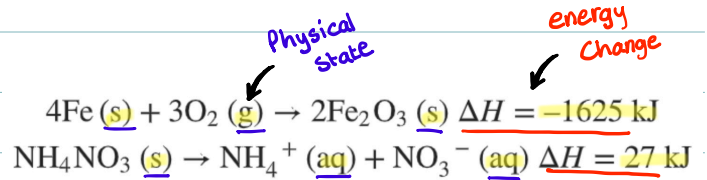
- Enthalpy change for **exothermic** reactions are always **negative**.
- Enthalpy change for **endothermic** reactions are always **positive**.

Thermochemical Equations :-

Combustion reaction : a chemical reaction that occurs when a substance reacts with oxygen.

Thermochemical equation :-

- balanced chemical equation.
- physical states of reactants & products
- energy change " ΔH "



Combustion :

- Is the reaction of a fuel with oxygen.
- Food is the fuel in combustion reactions in biological systems.

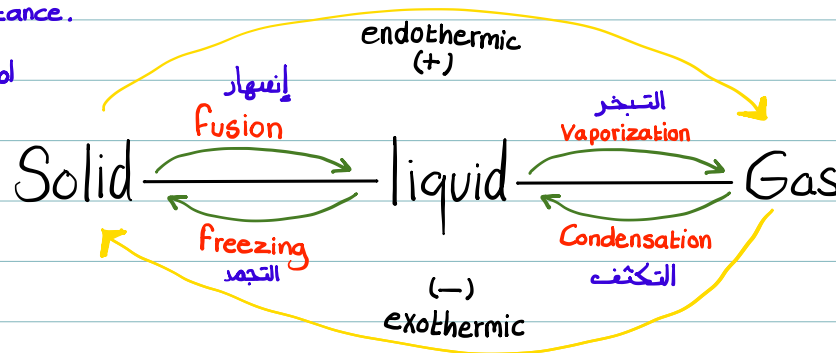
Standard Condition " ΔH° " :-

STP

Standard Temperature & Pressure
298K - 25C 1 atm

Enthalpy (heat) of combustion :-

- ΔH_{comb} of a substance is the enthalpy change for the complete burning of one mole of the substance.
- Unit : KJ/mol
- Molar enthalpy of Vaporization " ΔH_{vap} "
- Molar enthalpy of Fusion " ΔH_{fus} "



$$q = \left(\frac{\text{mass}}{\text{molar mass}} \right) \times \text{mol} \times \Delta H$$

Labels below the equation:
Total heat (under mass/molar mass)
moles (under mol)
molar enthalpy (under ΔH)

$$\text{KJ} = \text{mol} \times \text{KJ/mol}$$

Calculating Enthalpy Change :-

Hess's law :- When two or more thermochemical equations are added together to find the final equation.

imp

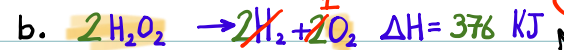
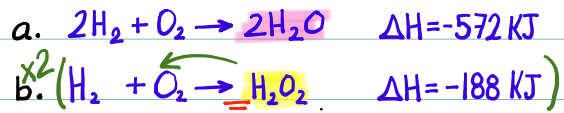
Note :

- If we switch sides the sign in ΔH will change
- If we multiply or subtract the equation we also do the same for ΔH

ex :-
We want the final equation same as this



We will check where are the same compound or element and rearrange them



If the element or the compound were we in the same side we will add them
if they were in a different sides we will subtract them



Check if your final equation is same as the equation they gave you. If it's the same your solution is correct

add the ΔH to find the final ΔH

Standard enthalpy (heat) of formation " ΔH_f° " :-

- is the change in enthalpy in one mole of a compound forms from its elements in their standard state.
- Elements in their standard states have a $\Delta H_f^\circ = 0.0 \text{ KJ}$

The summation equation :-

$$\Delta H_{\text{rxn}} = \sum \Delta H_f^\circ \text{ Products} - \sum \Delta H_f^\circ \text{ Reactants}$$

A model for Reaction Rates :-

Reaction rate : the change in concentration of a reactant or product per unit of time.

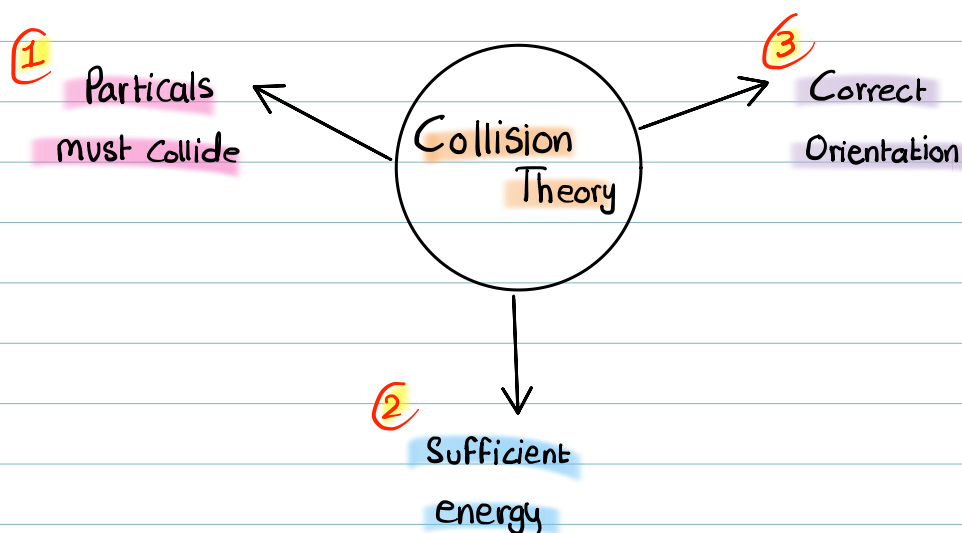
- Reaction rates are determined experimentally

$$\text{Average reaction rate} = \frac{\Delta[\text{reactant}]}{\Delta t} = \frac{\Delta[\text{Product}]}{\Delta t}$$

$\uparrow$
mol/L.s

Collision Theory :-

Atoms, ions, and molecules must collide in order to react.



Activation Complex (transition state) :-

is a temporary, unstable arrangement of atoms in which old bonds are breaking and new bonds are forming.

Activation energy " E_a " :-

The minimum amount of energy that reacting particals must have to form the activated complex

High Activation energy = Slower reaction rate

Low Activation energy = Faster reaction rate

Reaction Rate law :-

Rate law :- expresses the relationship between the rate of a Chemical reaction & Concentration of the reactants

The K does not change with Concentration but does change with temperature

Specific rate constant

$$\text{Rate} = K[A]$$

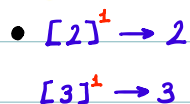
unit of K : " Ms^{-1} " : Unique for every reaction

reaction order :-

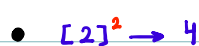
Zero-Order reaction

- The rate does not Change

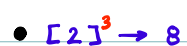
1st-Order reaction



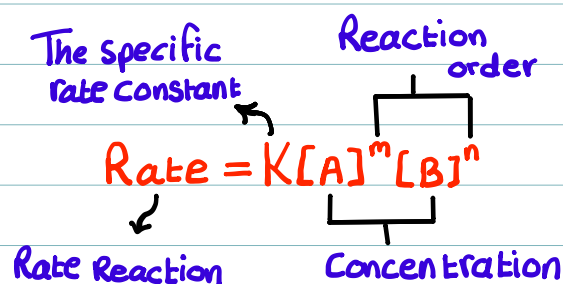
2nd-Order reaction



3rd-Order reaction

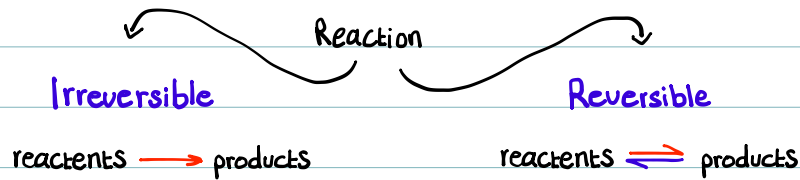


The overall reaction order $\Rightarrow m + n$



Instantaneous Reaction Rates & Reaction Mechanisms 2

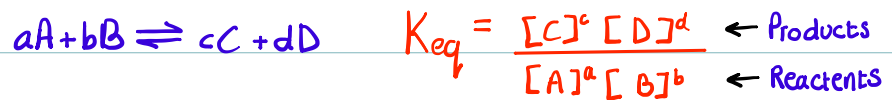
A State of Dynamic Balance :-



Chemical Equilibrium :-

- occurs when and reverse reactions in a chemical system happen at the same rate so the concentration remain constant (not necessarily equal)
- Ratio of reactant and product concentration has a constant value $\Rightarrow$ " K_{eq} "

The equilibrium Constant Expression :-



$K_{eq} > 1$ (more products) أفضلية Products are favoured at equilibrium

$K_{eq} < 1$ Reactants are favoured at equilibrium
(more reactants)

متجانس
Homogeneous
equilibrium

- Reactants & Product are in the same physical state

غير متجانس
Heterogeneous
equilibrium

- Reactants & Product are in more than one physical state

Note:

We don't put (l) and (s) in K_{eq} equations

Factors Affecting Chemical Equilibrium :-

Le châtelier principle :

- if stress is applied to a system at equilibrium
the system shifts in the direction that relieves the stress
- Stress : any kind of change in a system that upsets / changes the equilibrium

Equilibrium Shifts to the "right"

- 1 Add a reactant
- 2 Remove a product

Equilibrium Shifts to the "left"

- 1 Remove a reactant
- 2 Add a product

Factors Affecting Equilibrium :

① Concentration :

② Pressure & Volume :

$$P \propto \frac{1}{V}$$

- Only if the numbers of moles are different will shift

③ Temperature & K_{eq} :



endothermic

will shift to the right



exothermic

will shift to the left



④ محفز Catalysts & equilibrium :

- 1 Catalysts speed up in both directions

- 2 reaches equilibrium more quickly

- 3 No change in the amount of product formed

- 4 No shift



Thank

you



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دعاء بعد المذاكرة

اللهم اني استودعتك ما قرأت وما حفظت وما وقعت عيني عليه فرده لي عند حاجتي اليه انك على كل شيء قدير، حسبي الله ونعم الوكيل