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CLASS 11 CHEMISTRY

ENGLISH MEDIUM

10-PAGE DEMO

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Some Basic Concepts of Chemistry

Chemistry :- The branch of science that deals with the studies of the preparation, properties, structure and reaction of material substances is called chemistry.

Some facts that tell about chemistry in Ancient India:-

- In India, chemistry was called Rasayan Shashtra, Rastantra, Ras kriya or Rasvidya.
- Rigveda, describes tanning of leather and dyeing of cotton.
- Kautilya's Arthashastra :- describes the production of salt from sea.
- Sushruta Samhita :- explains importance of Alkalies.

Structure of Atoms

Initially, according to Dalton's Atomic Theory it was considered that atoms are indivisible.

But atoms have three subatomic particles called electron, proton and neutron.

Discovery of Electron

- Electron was discovered by J.J. Thomson, by an experiment of cathod ray tube.
- A cathod Ray tube is made up of glass containing two thin pieces of metal called electrodes, sealed in it.
- Thomson passed electricity at high voltage through a gases of very low pressure in a discharge tube.
- He observed a stream of particles moving in a tube from -ve to +ve electrode called as cathod rays.

Classification of Elements & Periodicity in Properties

- ⊕ Elements are the basic units of all types of matter.
- + In 1800 → 31 elements were known
1865 → 63 elements were known
- + At present, 118 elements are known to chemists, so there was a need to classify elements.

Need for classification of Elements

- It is very difficult to study such a large no. of elements individually.
To ease out this problem, scientists, organise their knowledge to search a systematic way.

Chemical Bonding & Molecular Structure

Chemical Bond:- The attractive force which holds various constituents (atoms, ions) together in different chemical species is called a Chemical Bond.

Cause of chemical combination?

- ▶ Earlier it was believed that elements combine to achieve Noble Gas Configuration. (Octet Rule)
- ▶ Actual theory - To lower potential energy of the system. Because when energy is minimum, there is a maximum stability.

Thermodynamics

Thermodynamics is the branch of Science that deals with heat, work, temperature, and energy, and how they relate to each other and the properties of matter. It studies the transfer and transformation of energy, focusing on the laws that govern these processes within a system and its surroundings.

Importance of thermodynamics -

- helps to predict whether any given chemical reactions take place or not under certain conditions.
- Laws of thermodynamics apply in equilibrium or move from one to another.

Thermodynamics Terms

System	surrounding	universe
Part of universe which is under observation	Rest of the part of universe (other than system)	universe = system + surrounding

Equilibrium

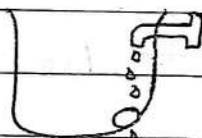
→ Equilibrium represents the state of a process in which the properties like temperature, pressure, concentration of the system do not show any change with time.

→ Equilibrium is attained when rates of the two opposing process become equal.

[Forward Reaction Speed = Backward Reaction Speed]



Static equilibrium.



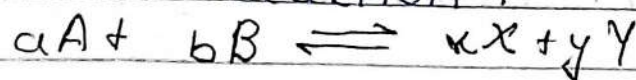
Dynamic equilibrium.

* Chemical equilibrium is an example of Dynamic equil.

→ Physical Equilibrium - only involves physical changes.

→ Chemical equilibrium - involves chemical Reactions.

It is the particular case of Reversible Reaction.

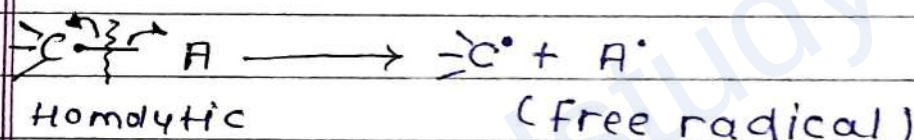
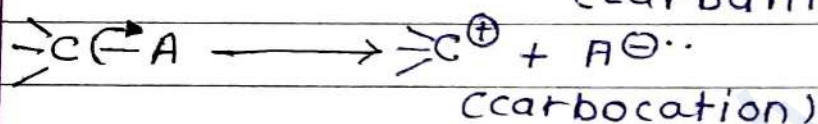
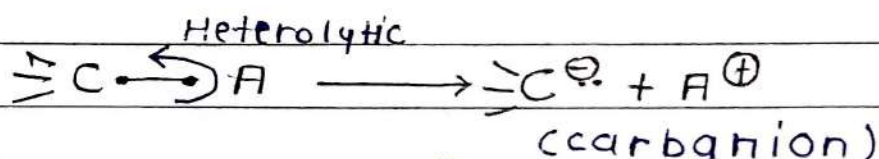


General Organic Chemistry (GOC)

Reactive Intermediates

Reactant $\xrightarrow{\text{Reagent}}$ Intermediate $\rightarrow$ Product + By Product.

Bond Fission or Cleavage

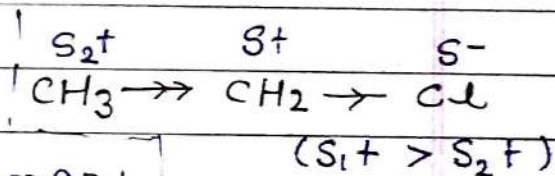


Effects

(1) Permanent effect $\rightarrow$ Always operate

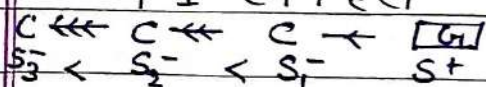
(a) Inductive effect

- Operate to σ bond
- Partial charge development
- Can be neglected after 3rd carbon atom.



Distance Dependent

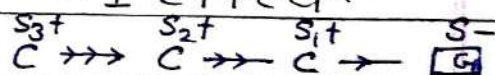
+I effect



* carbon chain gains the e⁻

* +I group electron donating group or electron releasing group.

-I effect



* carbon chain loses e⁻

* -I group or electron withdrawing group or electron seeking group.

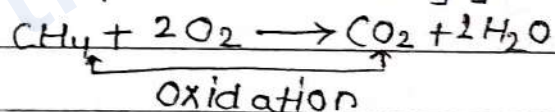
Redox Reactions

- Reactions in which oxidation and reduction takes place simultaneously is known as redox rxn.
- These reactions find extensive use in pharmaceutical, biological, industrial metallurgical & agricultural areas.
- Ozone hole, Corrosion, Extraction of Metals from its ore, hydrogen economy, Fuels burning all are a result of redox reaction.

Classical Idea of Redox Reactions

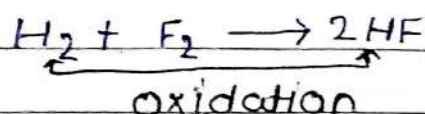
Oxidation

1. Acceptance of oxygen

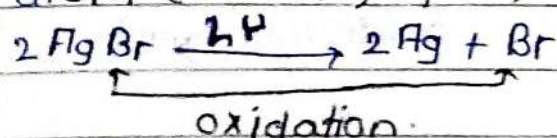


2. Removal of hydrogen

3. Accepting electronegative atoms (F, O, N, Cl, Br, S, I)

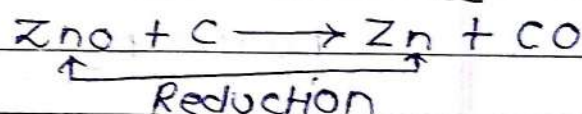


4. Removal of Electropositive atom (Metals, C, H)



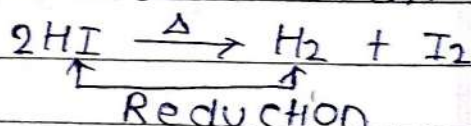
Reduction

1. Removal of oxygen

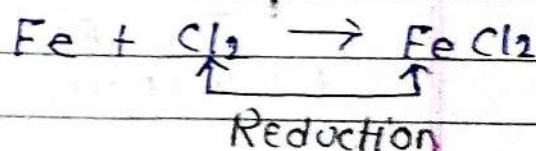


2. Acceptance of hydrogen

3. Removal of EN atom

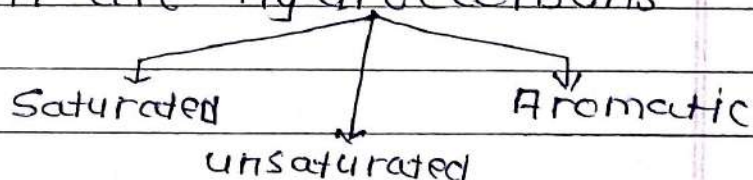


4. Addition of E-P atom



HYDROCARBONS

>> The compounds which are made up of only C and H are hydrocarbons



Alkanes

→ Compound of C with single bond (σ).

→ General formula C_nH_{2n+2}

Homologous Series $\Rightarrow$ Series in which succeeding members differ by CH_2 or 14 unit mass.

• CH_4 C_2H_6 C_3H_8 C_4H_{10} - - - -

>> Isomerism $\Rightarrow$ shown chain, position, conformational isomerism.

>> Alkanes also known as paraffins (little affinity)

► General methods of preparation of Alkanes

① From Unsaturated Hydrocarbon
[Reduction of Alkene & Alkyne/
Hydrogenation - catalytic]