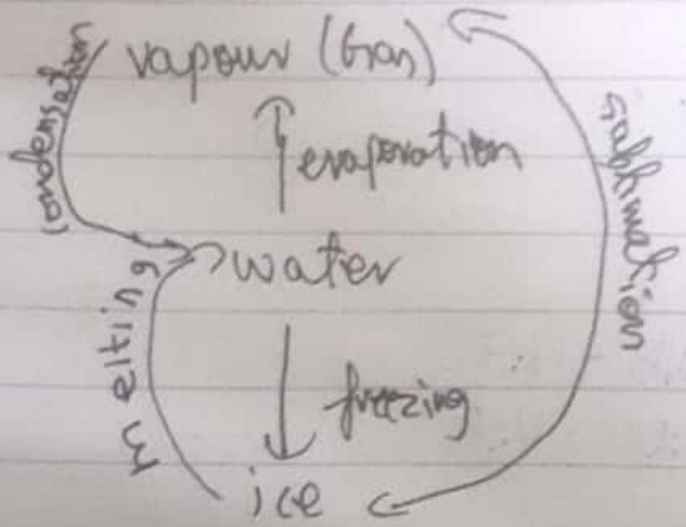
Atomic Structure

Q) What is Chemistry?
Ans) It is the study of matter & its changes.

Q) What is a chemical reaction?
Ans) Sharing or transfer of electrons.



matter

pure water
pure = substance

sea water
impure = mixture

100% pure H_2O
chemically combined compound

100% pure iron (Fe)
same type of particles
element

Q) what is an atom?

Ans) It is the smallest particle of an element which taken part in a chemical reaction.

Atomic Number (Proton Number) (Z)

Q) What is an atomic number?

Ans) Number of protons in the nucleon of an atom

* Atomic Number/proton number is the identity of an element. If protons are changed, the element will change.

Mass Number — Nucleon Number A

Sum of protons and neutrons in the nucleon of an element.

particle	mass	charge
proton	1	+1
neutron	1	0
electron	$\frac{1}{1940}$	-1

Ion

Q) What is an Ion?

Ans) It is a charged particle

* Number of protons are always equal to the number of electrons in an atom.

If 7+ 5- = 2+

Two more protons than electrons

or

two less electrons than protons.

Isotopes

Q) What is an 'istope'?

Ans) Atoms of the same element with a different number of neutrons or different mass.

Isotopes of hydrogen

$^{1}_{1}H$ Hydrogen

$^{2}_{1}H$ / $^{2}_{1}D$ ~~Deuterium~~ Deuterium

$^{3}_{1}H$ / $^{3}_{1}T$ tritium

* The chemical properties of ~~an element~~ substances depend on its ~~outermost shell~~ electrons present in the outermost shell

* isotopes are chemically identical because they have

the same number of electrons in the outermost shell.

* elements which emit energy (alpha, gamma, beta) invisible radiations are called radioactive elements. This phenomena is called radioactivity.

Uses of radioactive isotopes

① Uranium:-
- nuclear power, weapons, power generation

② Phosphorus ($^{32}_{15}P$) / Iodine
cancer treatment

③ Carbon ($^{14}_{6}C$)
carbon dating

Isotopes and Abundance

^{11}B	^{12}B
20%	80%

$$\frac{11 \times 20 + 12 \times 80}{100} = 11.8$$

Electronic Configuration / Arrangement

"Accomodation" of electrons in shells or energy levels is called electronic configuration