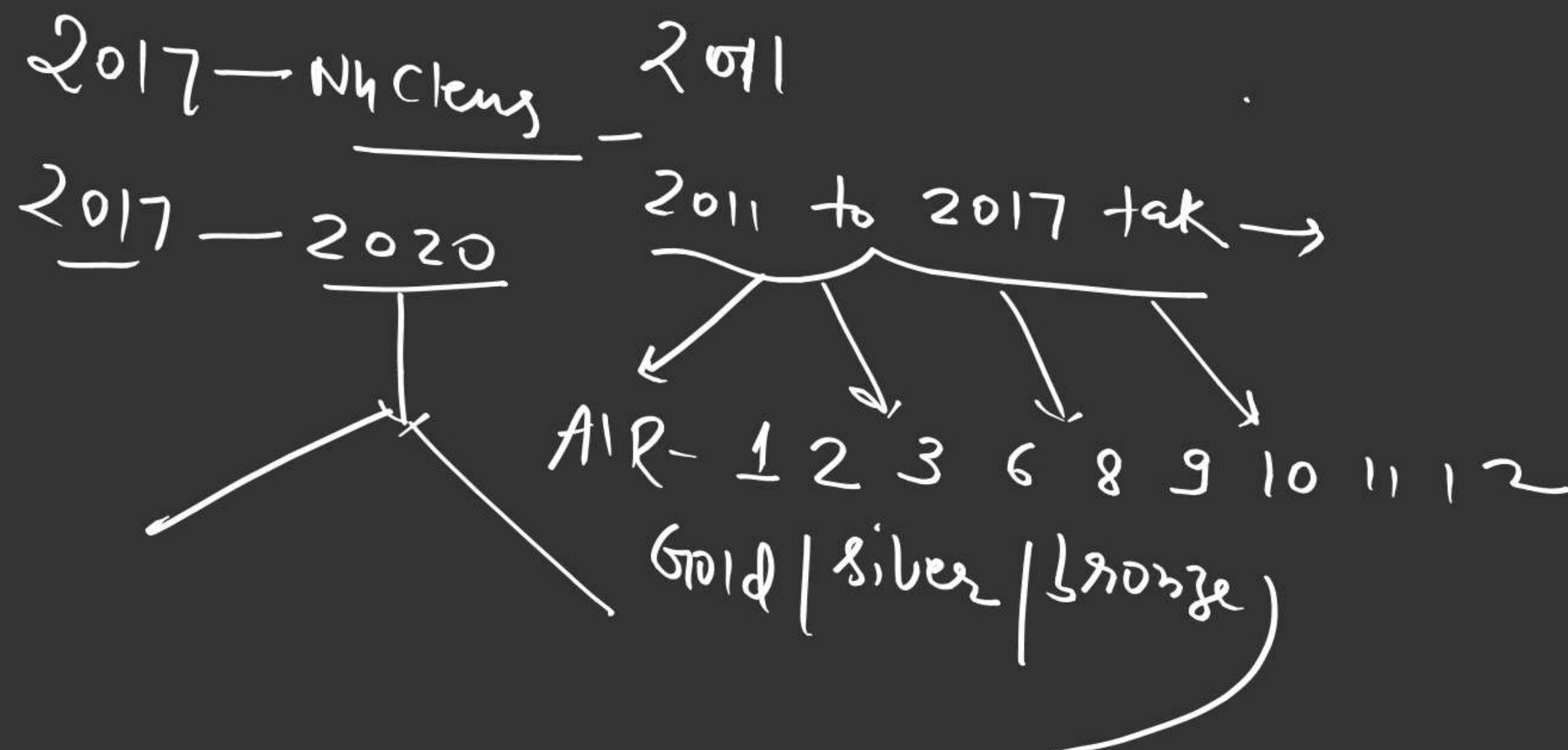


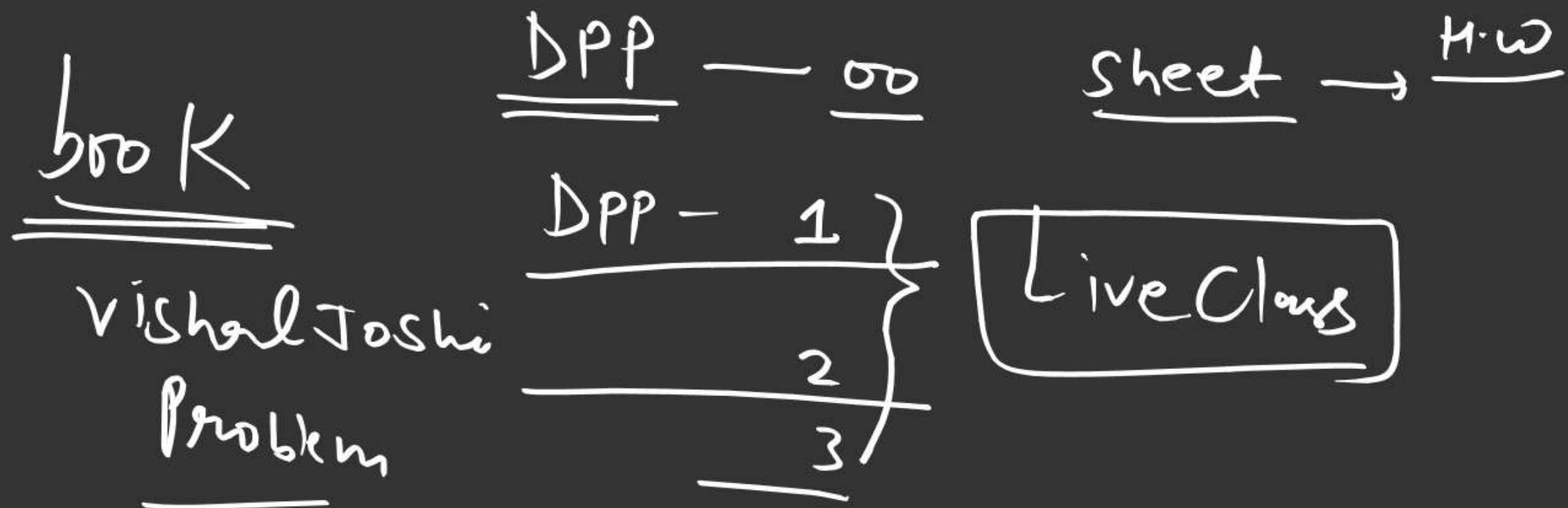
GENERAL CHEMISTRY

➤ Chemistry:

It is a branch of physical science, which deals with the study of matters,
its physical and chemical properties, chemical composition, physical and
chemical changes, which it undergoes and the energy changes accompany
these process.

Vishal Joshi (VJSIR)
22 y.





level → JEE mains | Adv.

General Chemistry

GENERAL CHEMISTRY

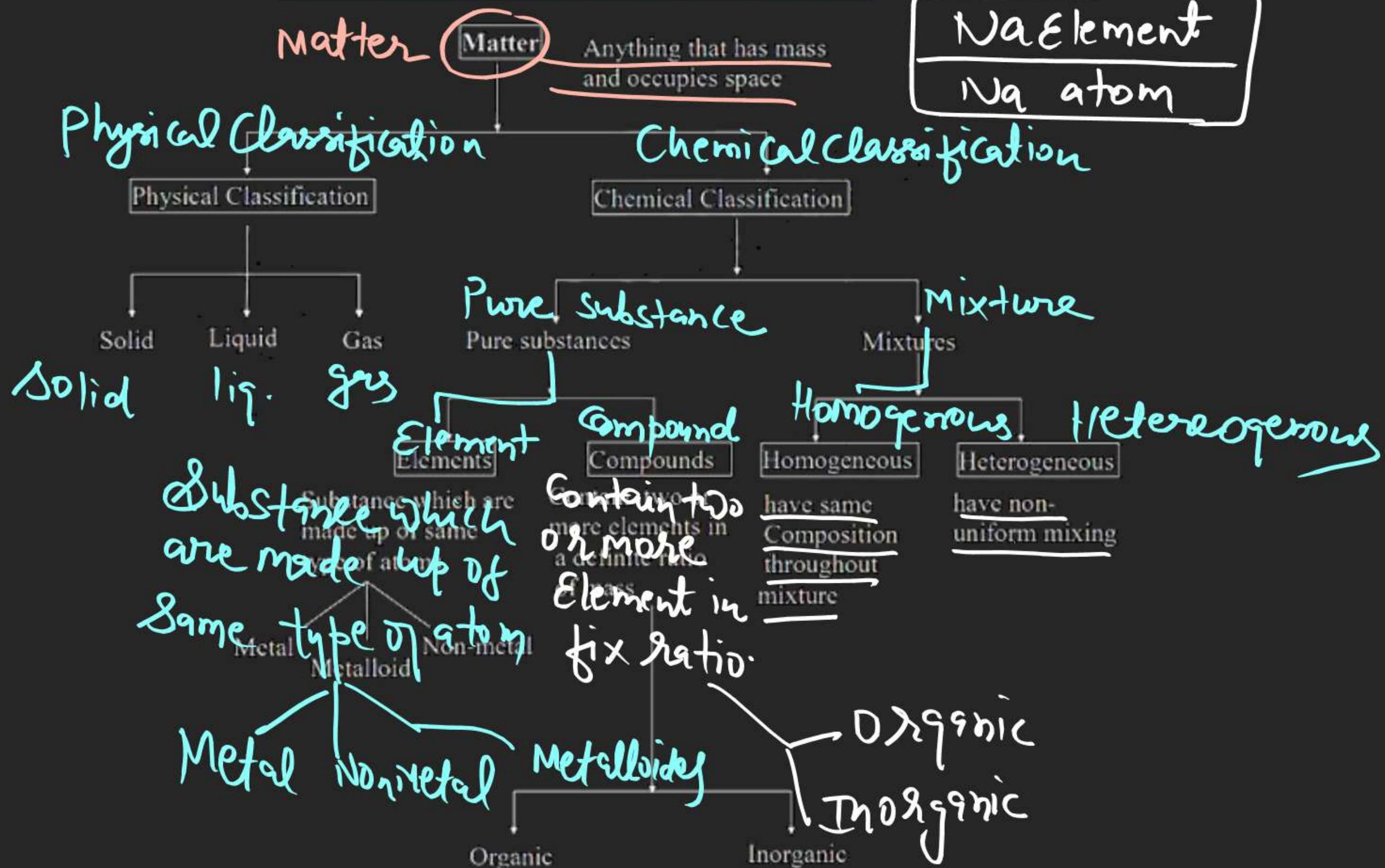
➤ Type of chemistry

• Organic chemistry : Study of hydrocarbons and their derivatives.

• Inorganic chemistry : Study of all known elements and their compounds except hydrocarbons and their derivatives

Physical chemistry : Study of laws governing by physical and chemical changes

GENERAL CHEMISTRY



GENERAL CHEMISTRY

- Physical Substance: Three types on the basis of physical state.

Property	Solid	Liquid	Gas
Particle distance	Minimum	Moderate	Maximum
Density	Maximum	Moderate	Minimum
Volume	Minimum	Moderate	Maximum
Shape	definite shape	no definite shape	no definite shape

GENERAL CHEMISTRY

➤ Atomicity: Number of atoms in a molecule.

Example: S_8 Se_8 Te_8 Po
 N_2 O_2 H_2 X_2 $[X \rightarrow F, Cl, Br, I]$
 P_4 As_4 Sb_4 Bi

P_4

S_8

➤ Examples of non-metal:

Liquid - Bromine

Gas - N_2 , O_2 , H_2 , Cl_2 , F_2 , all noble gas (He, Ne, Ar, Kr, Xe, Rn)

Solid - Phosphorus, Sulphur, Iodine

➤ Examples of metal:

Liquid metal – Hg

Solid - Iron, Sodium, Aluminium

GENERAL CHEMISTRY

Metalloid : Element which shows both metallic and non-metallic property

Example : Si, As, Sb, Ge, B, Te, Po

Compound : Made up of two or more than two different type of atom.

Example : H₂O oxidane NH₃ azane PH₃ phosphane

CH₄ methane BH₃ borane PbH₃ plumbane

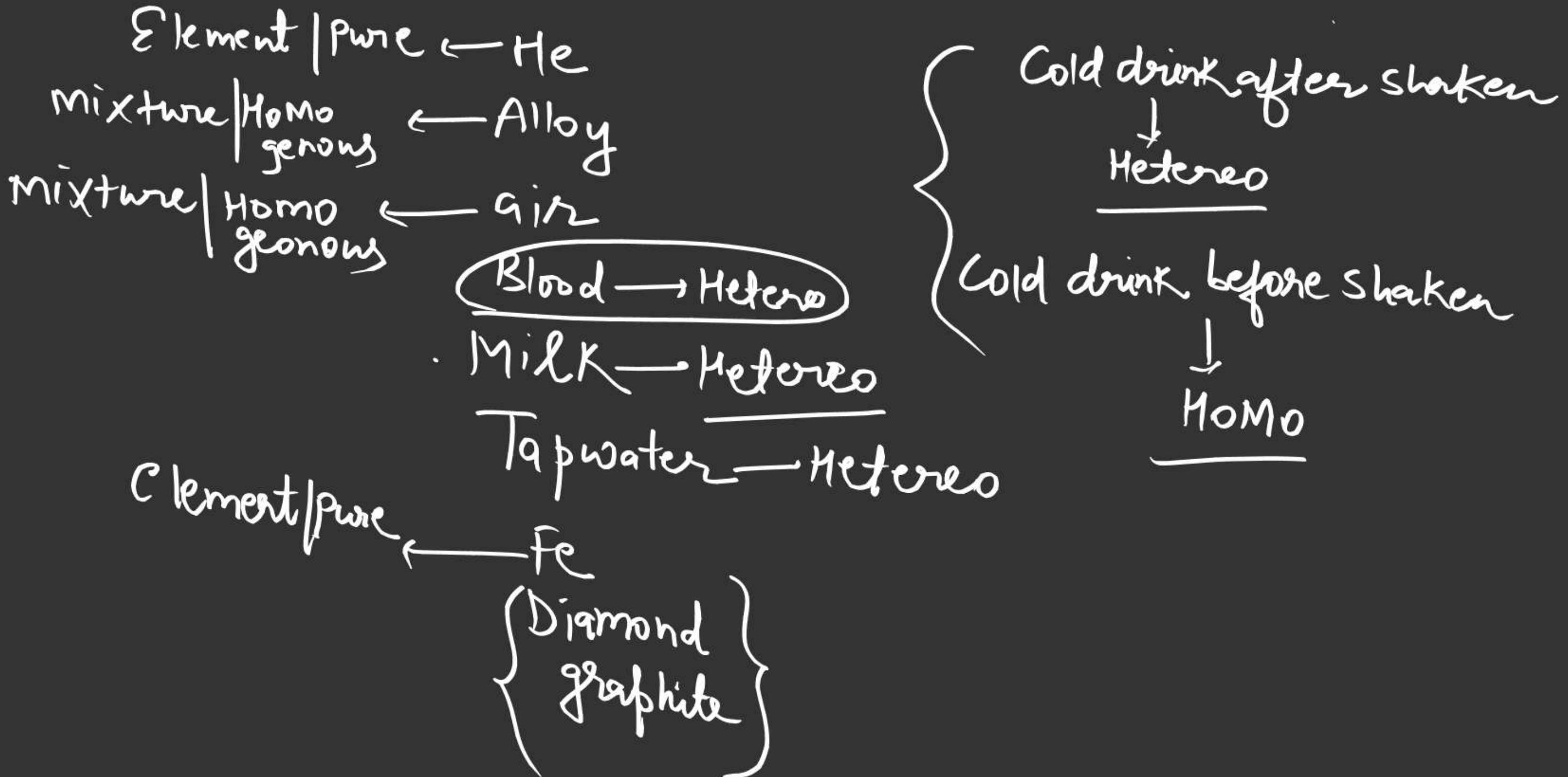
Element : Substance made up of same atoms

Compound : Substance made up of two or more elements in a fixed ratio by mass.

GENERAL CHEMISTRY

Homogenous mixture : The mixture which has same composition throughout.

Heterogeneous mixture : The mixture which has different composition throughout.



allotrope → (Element) pure

Carbon allotrop 
Diamond
graphite
fullerene

GENERAL CHEMISTRY

Example :-

Matter

He

Diamond

Graphite

Iron

Air

Alloy

Tap water

Classification

Pure → element → non-metal

Pure → element → non-metal

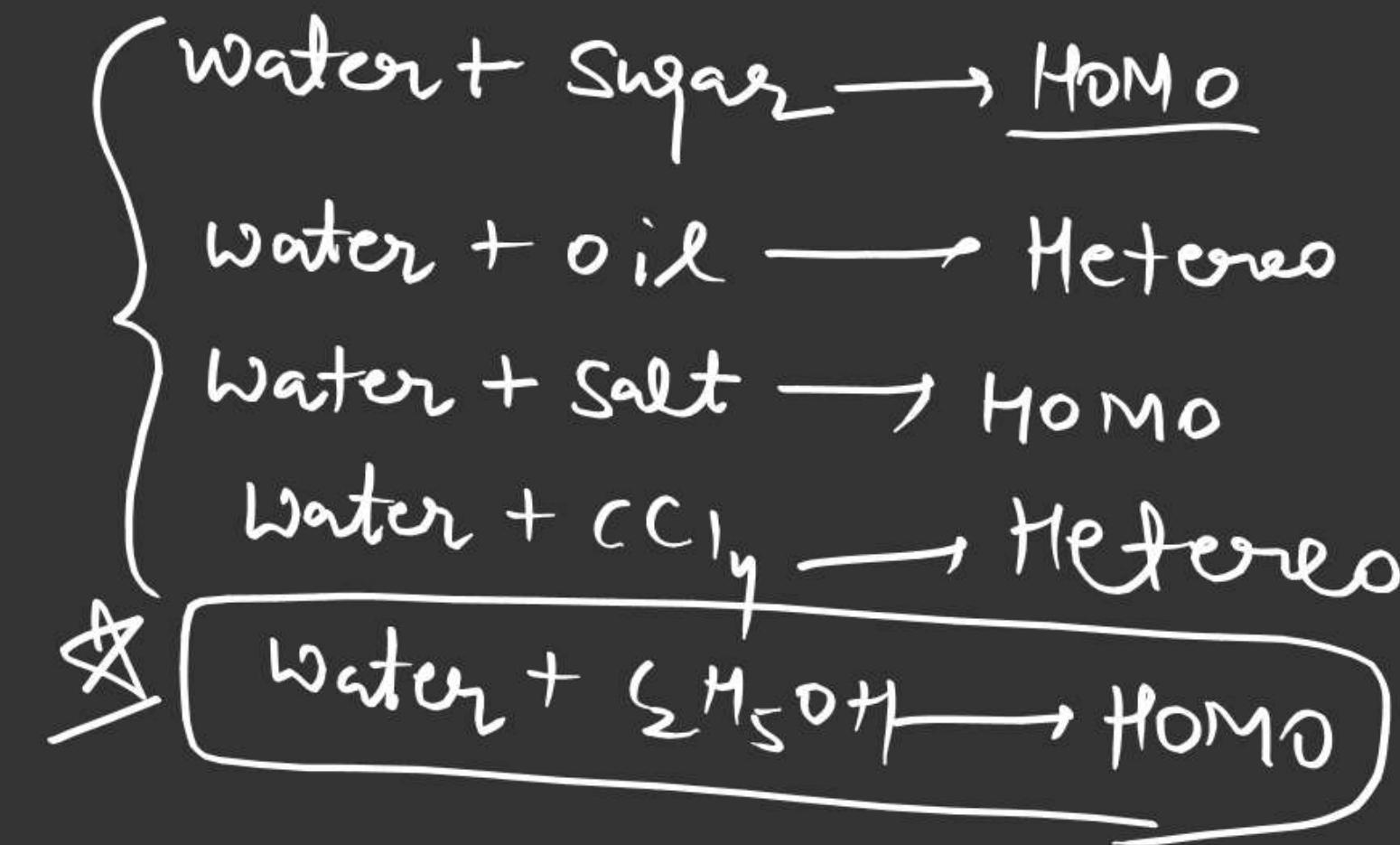
Pure → element → non-metal

Pure → element → metal

mixture → homogenous

mixture → homogenous (Note: All alloy are homogenous mixture)

mixture → heterogeneous (Bacteria not distributed equally)



GENERAL CHEMISTRY

~~Z~~
~~A~~

Z = Atomic number [number of proton]

A = Mass number [number p + number n]

$$\text{number of } n = \underline{\underline{A - Z}}$$

Isotope → atoms of same element
having same atomic number
diff mass number



GENERAL CHEMISTRY

e

Name of Particle	Mass	Nature of charge	Amount of charge	Presence in the atom
(i) Electron Symbol = (e) Notation = ${}_{-1}e^0$ Discoverer J.J.Thomson (1897)	9.11×10^{-28} g $\frac{1}{1837}$ th of H-atom	Negatively Charged	-1.602×10^{-19} Coulomb Or -4.8×10^{-10} e.s.u	Outside the nucleus
(ii) Proton Symbol = (p) Notation = ${}_{+1}H^1$ Discoverer Rutherford (1911)	1.6725×10^{-24} g	Positively Charged	$+1.602 \times 10^{-19}$ Coulomb Or $+4.8 \times 10^{-10}$ e.s.u	Inside the nucleus of an atom
(iii) Neutron Symbol = (n) Notation = ${}_{0}n^1$ Discoverer J. Chadwick (1932)	1.6725×10^{-24} g	Neutral	0	Inside the nucleus of an atom

GENERAL CHEMISTRY



Representation of atom:



where,

A → Mass number : (total number of protons + total number of neutrons present in an atom.)

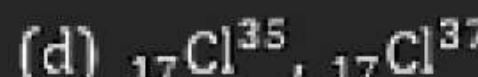
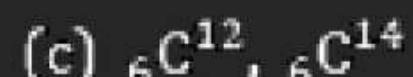
Z → Atomic number : (total number of protons present in an atom.)

Example :- $_{20}^{40} Ca$

GENERAL CHEMISTRY

➤ Isotope : Atoms of given element which have same atomic number but different mass number are called isotope.

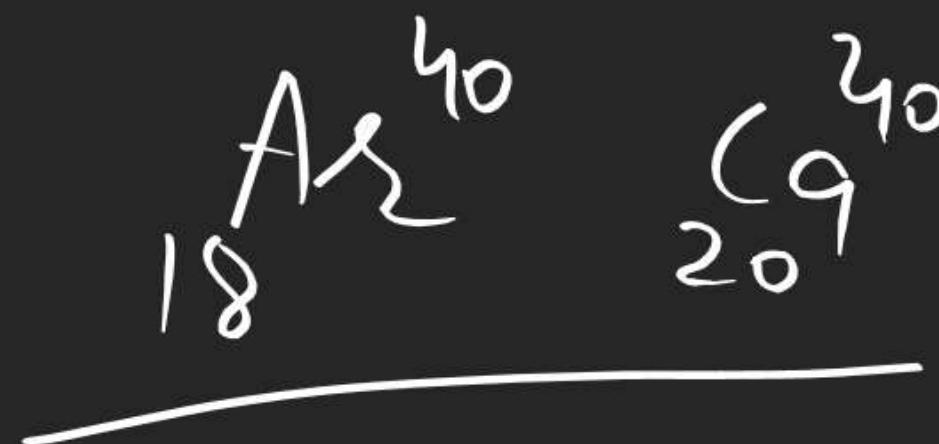
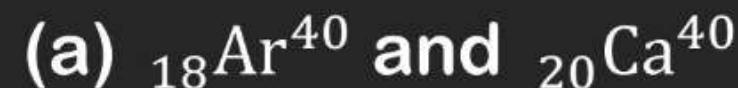
Example:



GENERAL CHEMISTRY

➤ Isobar : Atoms of different elements with the same mass number but different atomic number

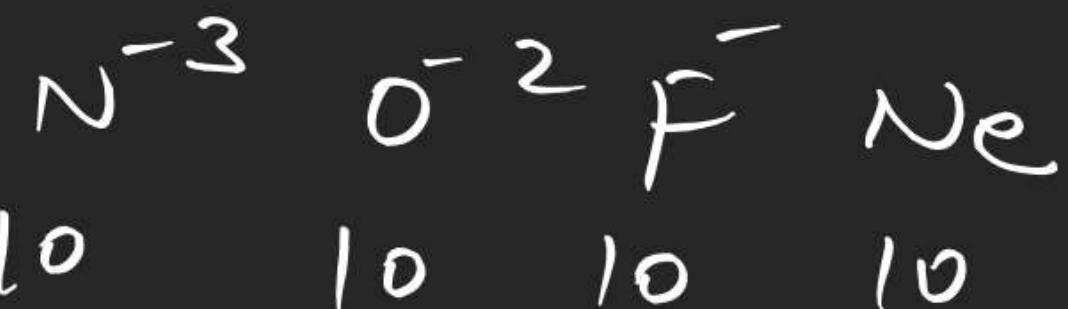
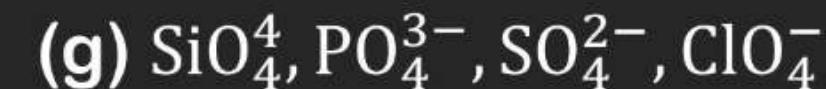
Example:



GENERAL CHEMISTRY

➤ Iso-electronic species : Species (atom, molecules or ions) having same number of electrons are called iso-electronic.

Example :

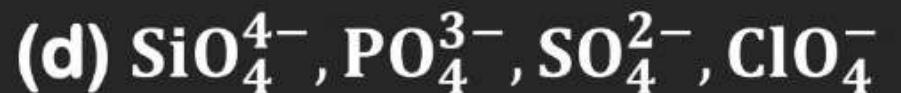


Note : Now a days this concept is extended to consider the same valence shell electron also.

GENERAL CHEMISTRY

➤ Iso-sters : Species having same number of electrons & same number of atoms.

Example:



no. of atom 3



3

$$\begin{aligned}
 \text{no. of e}^- &= 6 + (8 \times 2) \\
 &= 22 \\
 &\underline{\quad} \\
 &14 + 8 \\
 &\underline{\quad} \\
 &22
 \end{aligned}$$

GENERAL CHEMISTRY

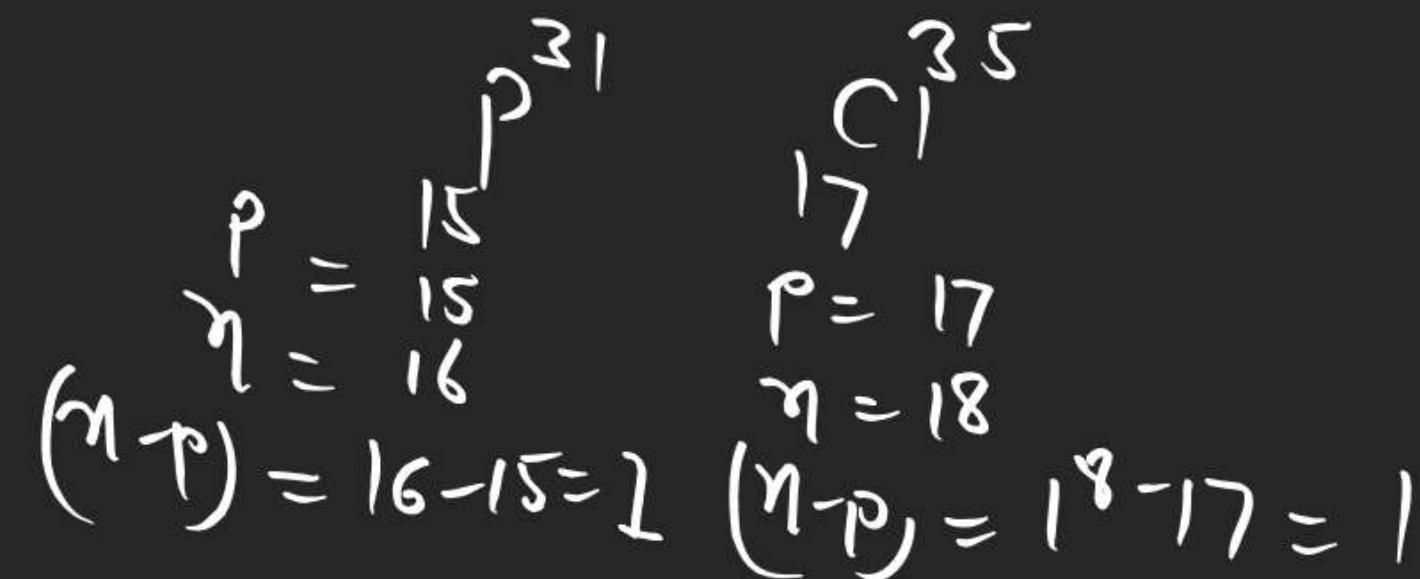
➤ Iso-diaphers : Species having same difference in number of neutrons and protons.

$$\frac{(n-p)}{=} \left| \begin{array}{l} \text{neutron excess} \\ \text{isotopic excess} \end{array} \right.$$

Example :

(a) $^{15}\text{P}^{31}$, $^{17}\text{Cl}^{35}$, $^{11}\text{Na}^{23}$, $^3\text{Li}^7$, $^{13}\text{Al}^{27}$, $^{19}\text{K}^{39}$, $^9\text{F}^{19}$, all have isotopic excess of $(A - 2Z) = 1$.

(b) $^6\text{C}^{14}$, $^8\text{O}^{18}$, $^1\text{T}^3$, $^{24}\text{Cr}^{50}$, all have isotopic excess of $(A - 2Z) = 2$.



GENERAL CHEMISTRY

Isotones: Elements having the same number of neutrons are known as isotones.

Example:

