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NEET FASTRACK 2024

Lecture No.- 01

Chemistry

Some Basic Concept of Chemistry

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TODAYS TARGETS

1. Introduction
2. Matter and its Classification
3. Atoms and Molecules
4. Formula of Compound

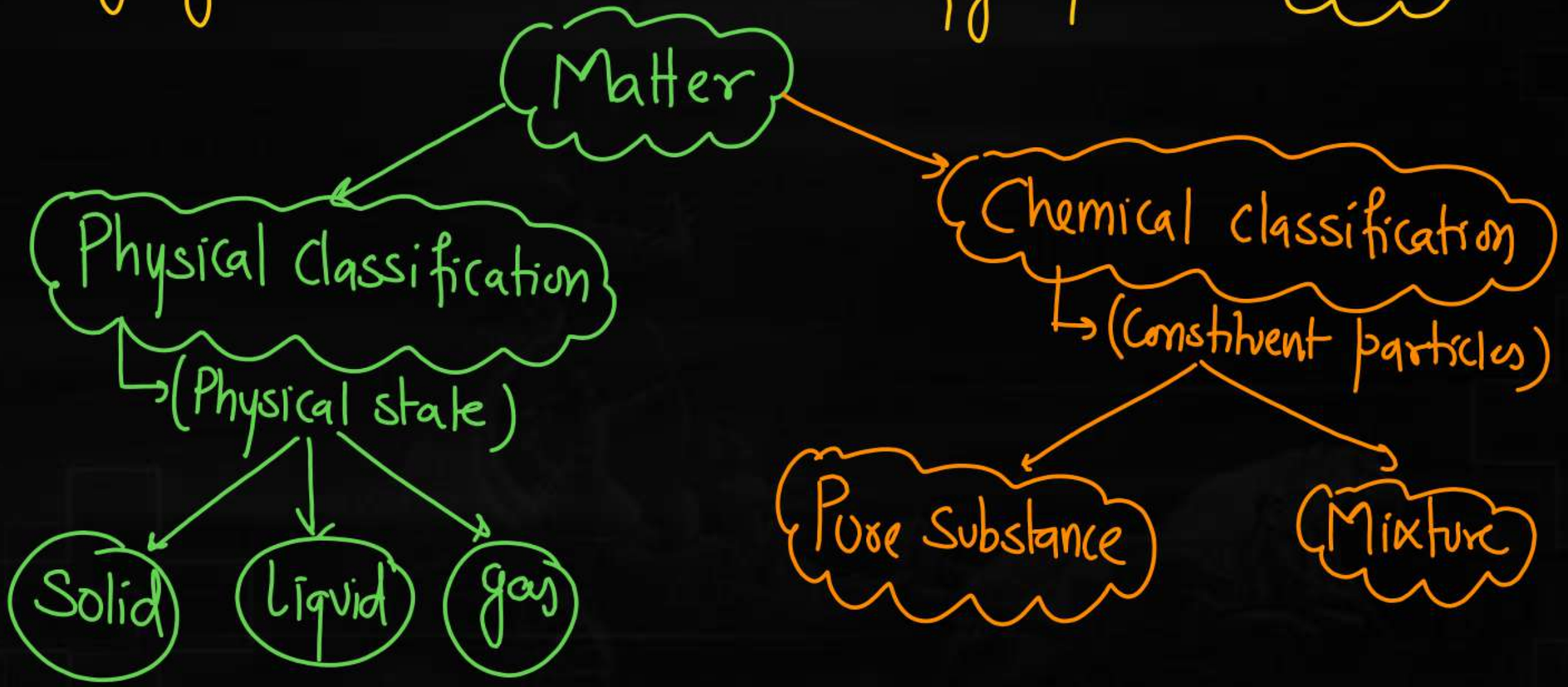
Introduction

Chemistry → " Branch of Science which deals with Physical/chemical properties of matter "

- Inorganic Chemistry → (study of inorganic comp.)
- Organic Chemistry → study of hydrocarbons and derivatives
- Physical Chemistry → (Physical measurment and study of physical prop.)

Matter

↳ Anything which has mass and occupy space → Matter



Physical state → movement of particles → "low"

① Soid state → specific shape, mass, volume → Fix

↓ → Force of attraction b/w particles → Strong

"Solids are Rigid in nature"

Ex → Chair, table, metal sheet, pen, pencil.

② Liquid state → * mass → Fixed
* Volume → Fixed
* Shape → variable (it acquires the shape of the container)

"liquids have tendency to flow"

* Force of attraction b/w particles → moderate

Ex ⇒ Water, alcohol, Honey, Oil

③ Gaseous state → * Shape, Vol → Variable

* Force of attraction b/w particles → low

"Gases are Compressible in Nature" → If you apply pressure you can reduce its volume

Ex → Air, O_2, N_2, Cl_2, F_2

Chemical classification

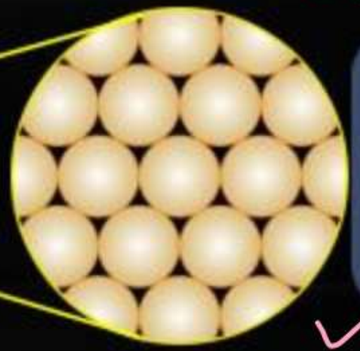
1. Pure Substance → Same type of particles (only one type)
   - Components: atoms, molecules
   - Elements
     - Metals
     - Non metals
     - Metalloids / Semi-metal
   - Compounds
     - Inorganic Compounds
     - Organic Compounds

2. Mixture / Impure Substance → two or more type of particles (Components)
   - Homogeneous mixture → No boundary separation b/w Components
   - Heterogeneous Mixture → (Boundary sep.)

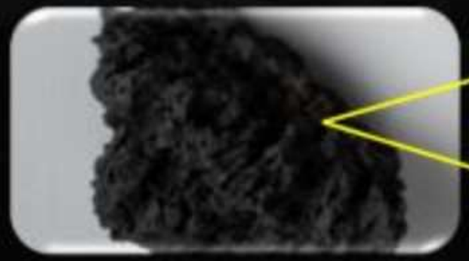
Elements

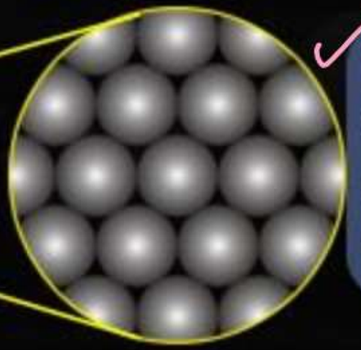
It is the simplest form of a pure substance which contains only one type of particles and have definite physical and chemical properties.

atoms



Gold is an element made up of only gold atoms.



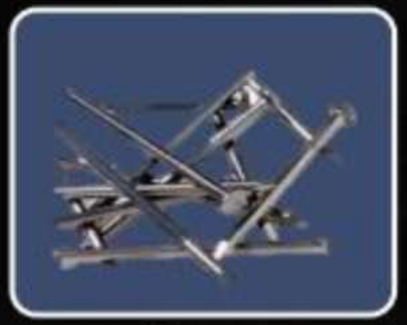


Carbon is an element made up of only carbon atoms.

Elements

→ Shiny Surface
→ Ductile
→ Sonorous
→ Malleable
→ Good Conductor of Heat and Electricity

Metals



Iron

Silver

Gold

[Cobalt, Sodium, Calcium, Aluminium, (Zinc)]

Elements

Nitrogen, Oxygen, Chlorine, Phosphorus

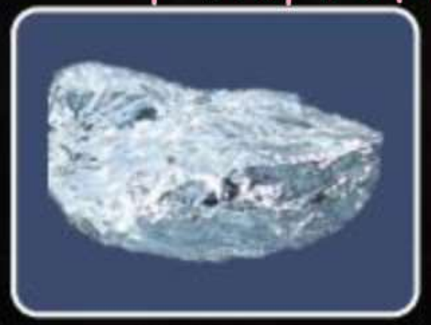
Si → Shiny
→ Conduction
↓
Brittle

Non-Metals

Carbon

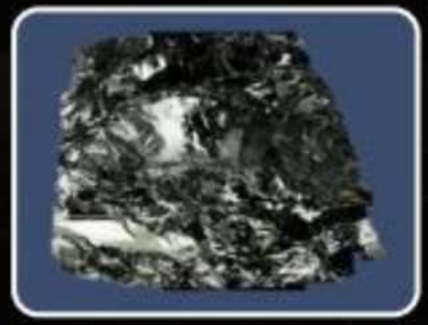
Sulphur

(Some properties of Non metal) ← Metalloids → Some prop. of metal



Silicon

Arsenic



Germanium

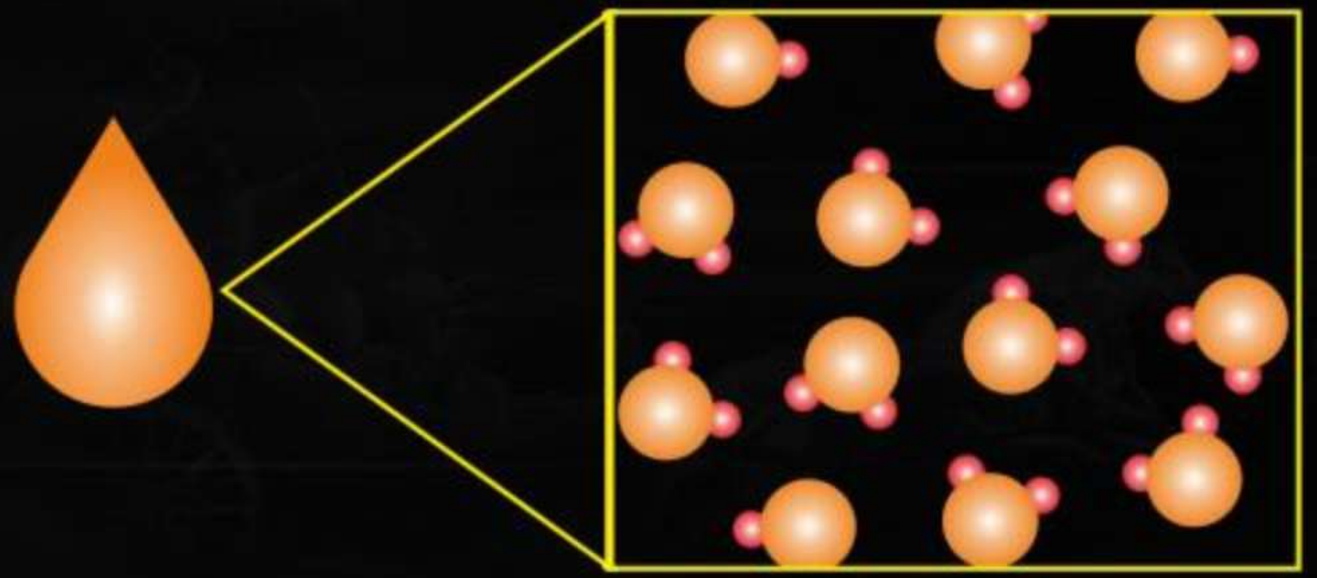
Compounds

H_2O → Water
- → Hydrogen
- → Oxygen

molecule → H_2O molecules

They are pure substance which contains more than one type of elements and have different properties than the constituent element.

↳ (same molecules formed by different atoms)



Compounds

Inorganic Compounds

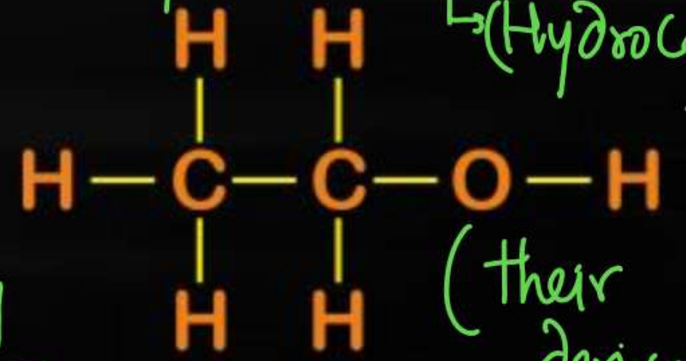
"Comp. derived from earth Crust"

Organic Comp:

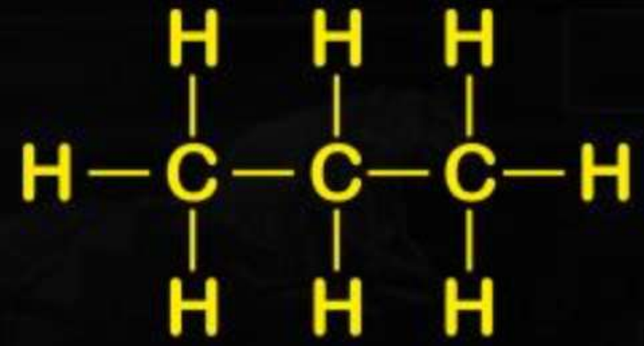
↳ Compounds of C, H

↳ (Hydrocarbons) + (their derivatives)

CH_4 (methane)



Ethanol C_2H_6O



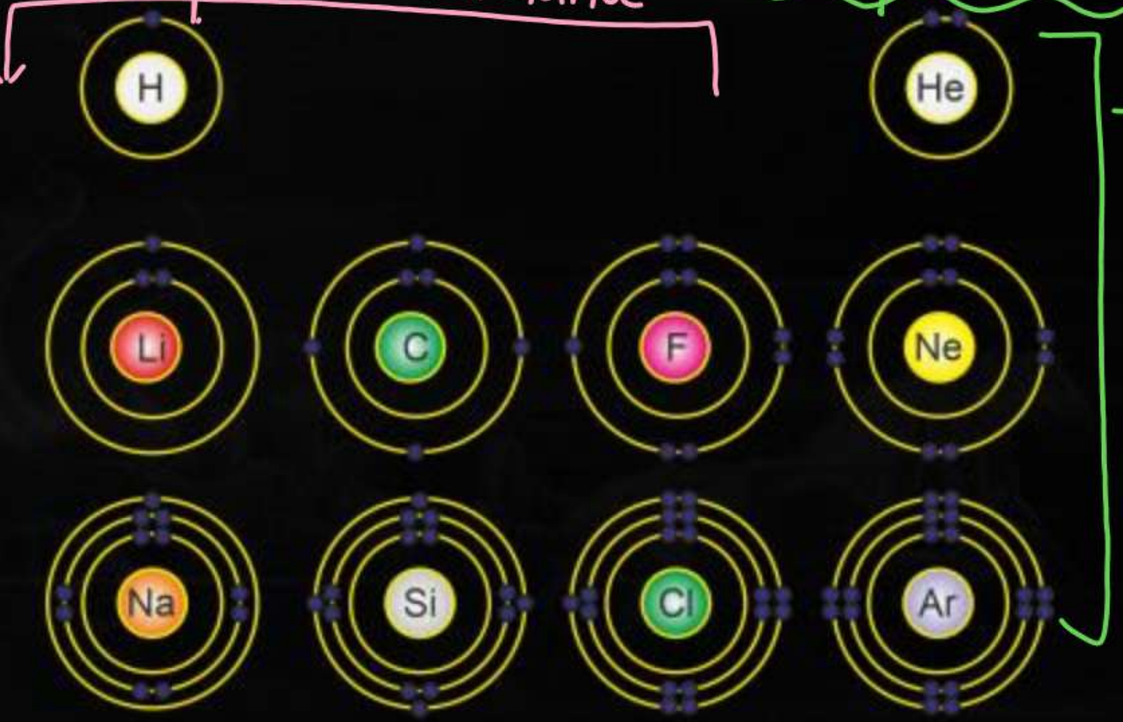
Propane C_3H_8

Atoms

The smallest particle of an element which may or may not be capable of independent existence.

"No Independent Existance"

Independent existance ✓



→ Noble Gases → Stable

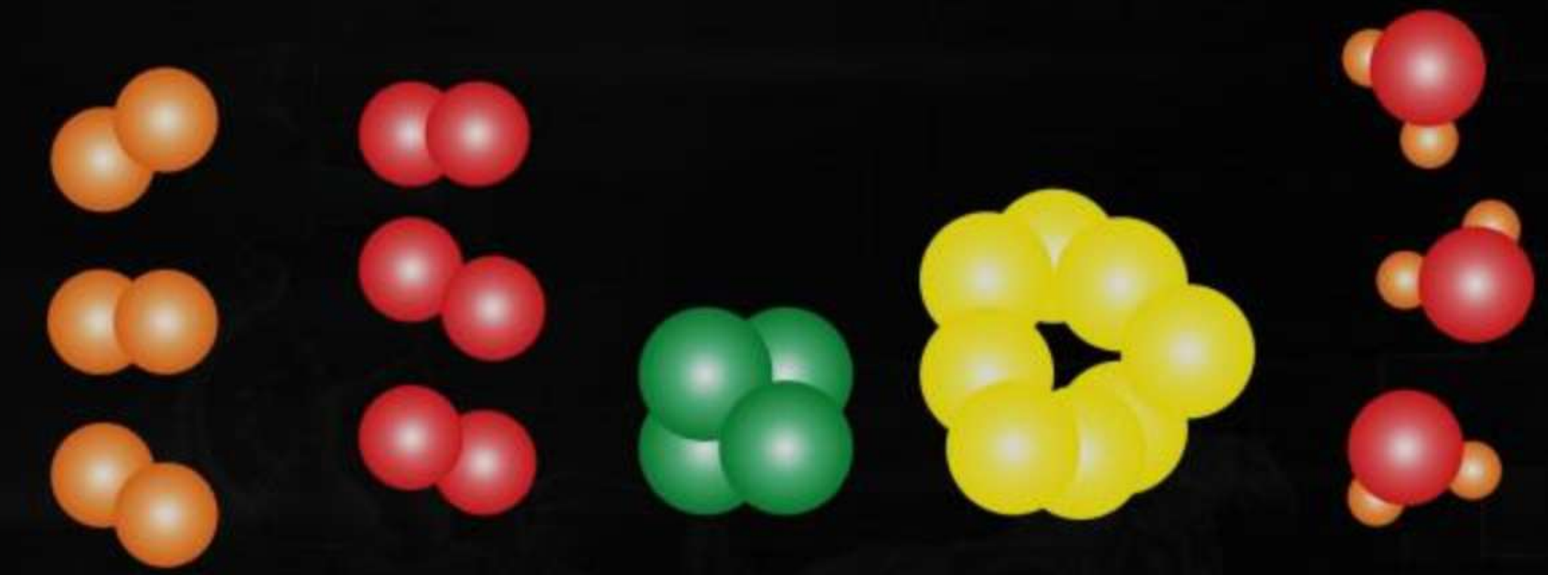
Molecules

H_2SO_4 molecule

- H atom
- S atom
- O atom

Fix Ratio

The smallest particle of an element or a compound which can exist freely.



Hydrogen H_2 | Oxygen O_2 | Phosphorus P_4 | Sulphur S_8 | Water H_2O

⇒ Formula of Compound → Ionic compounds → (Formed by ions)
↳ (Charged species)

"Nomenclature"

"Cations are named first and then anion will be named"

* Sodium chloride ($Na^{+}Cl^{-}$)
* Magnesium Oxide ($Mg^{2+}O^{2-}$)

Cations
+ively charged species
(loss of e^-)
(In gen. → Metals form Cations)

Anions
-ively charged species
(gain of e^-)
(In gen. → Non metals form anions)

⇒ Cations → Nomenclature → ("ium" as a suffix)

Na^{+} → Sodium ion

Li^{+} → Lithium ion

K^{+} → Potassium ion

Mg^{2+} → Magnesium ion

Ca^{2+} → Calcium ion

Ba^{2+} → Barium ion

Rb^{+} → Rubidium ion

Al^{3+} → Aluminium ion

Sr^{2+} → Strontium ion

* NH_4^{+}

Ammonium ion

* NO^{+}

Nitrosonium ion

* $H_2N-NH_3^{\oplus}$

(Hydrazinium ion)

* If any metal shows more than one type of cations → low charge → 'ous' suffix

Fe^{2+} → Ferrous ion

Sn^{2+} → Stannous ion

Fe^{3+} → Ferric ion

Sn^{4+} → Stannic ion → higher charge → 'ic' suffix

Cu^{+} → Cuprous ion

Cu^{2+} → Cupric ion

" In some cases, their gen. Name with charge is also used "

✓ lead (II) ion → Pb^{2+}

✓ lead (IV) ion → Pb^{4+}

✓ Tin (II) ion → Sn^{2+}

✓ Iron (III) ion → Fe^{3+}

Anions → "Negatively Charged ions" → "3 types of suffix."

① 'ide' ion → (−ve charge on mostly atom)

② "ate" ion ③ "ite ion"

(−ve charge on species containing O and non metals)

F^- → fluoride

Cl^- → Chloride

Br^- → Bromide

I^- → Iodide

H^- → Hydride

O^{2-} → Oxide

N^{3-} → Nitride

S^{2-} → Sulphide

P^{3-} → phosphide

N_3^- → Azide

NH_2^- → Amide

NH^{2-} → Imide

CN^- → Cynide

OH^- → Hydroxide

O_2^{2-} → peroxide

O_2^- → superoxide

less no. of oxygen
↳ 'ite ion'

More no. of Oxygen
↳ 'ate ion'

"ate ion"

SO_4^{2-} → sulphate ion

NO_3^- → Nitrate ion

CO_3^{2-} → Carbonate ion

HCO_3^- → hydrogen Carbonate (Bicarbonate)

PO_4^{2-} → phosphate ion

ClO_3^- → Chlorate ion

"ite ion"

SO_3^{2-} → sulphite ion

NO_2^- → Nitrite ion

ClO_2^- → Chlorite ion

* ClO^- → hypochlorite ion

* MnO_4^- → permanganate ion

* MnO_4^{2-} → Manganate ion

$C_2O_4^{2-}$
↳ Oxalate ion

CH_3COO^-
↳ Acetate ion

ClO_4^- → perchlorate ion

* $Cr_2O_7^{2-}$ → dichromate ion

* CrO_4^{2-} → chromate ion

$\Rightarrow$ $H_3PO_4 \longrightarrow H_2PO_4^- \longrightarrow HPO_4^{2-} \longrightarrow PO_4^{3-}$

(hydrogen phosphate) (Phosphate)

(Dihydrogen phosphate)

$\Rightarrow$ $H_3PO_3 \longrightarrow H_2PO_3^- \longrightarrow HPO_3^{2-}$

(dihydrogen phosphite) hydrogen phosphite

$\Rightarrow$ $H_3PO_2 \longrightarrow H_2PO_3^-$ → Hypophosphite

⇒ Formula of Compound

(1) Write the symbol of Cation and anion

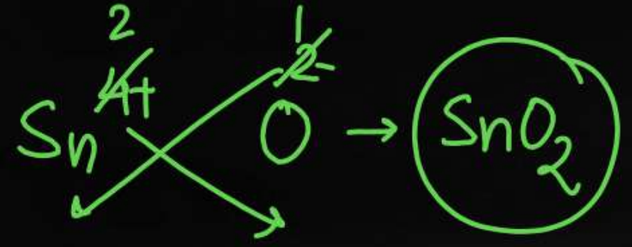
(2) Write their charges

(3) Cross multiply the minimum ratio of their charges

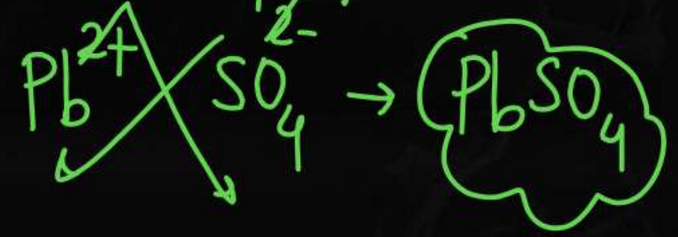
Ex → (a) Aluminum Oxide → Al^{3+} O^{2-} → Al_2O_3

(b) Potassium Oxalate → K^{+} $C_2O_4^{2-}$ → $K_2C_2O_4$

⇒ (c) Stannic Oxide



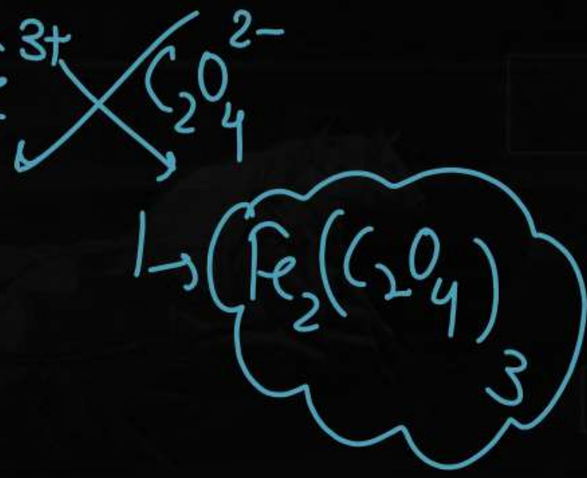
(d) lead (II) sulphate



(e) Ammonium chromate

↳ $(NH_4)_2CrO_4$

(f) ferric Oxalate



Question

Write the formula of following compounds:

1. Sodium Oxalate
2. Potassium Bicarbonate
3. Zinc Sulphite
4. Ferric Sulphate
5. Magnesium Hypophosphite
6. Copper (II) Perchlorate
7. Stannic Oxide
8. Calcium Phosphate
9. Strontium Chromate
10. Ammonium Peroxide


THANK You