

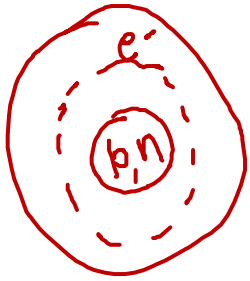
⇒ = Ions or chemical Formula



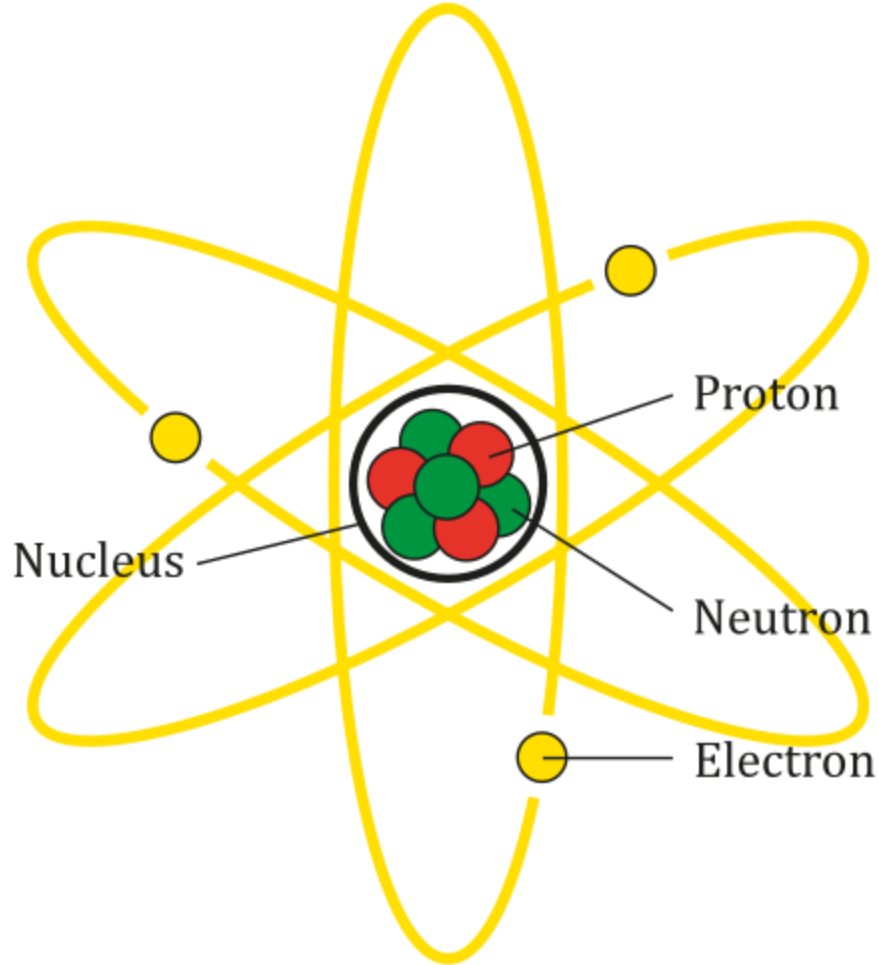
# SAFALTA CLASS<sup>TM</sup>

An Initiative by **अमरउजाला**

# ATOM



Neutral  
321211  
 $e^- = p^+$

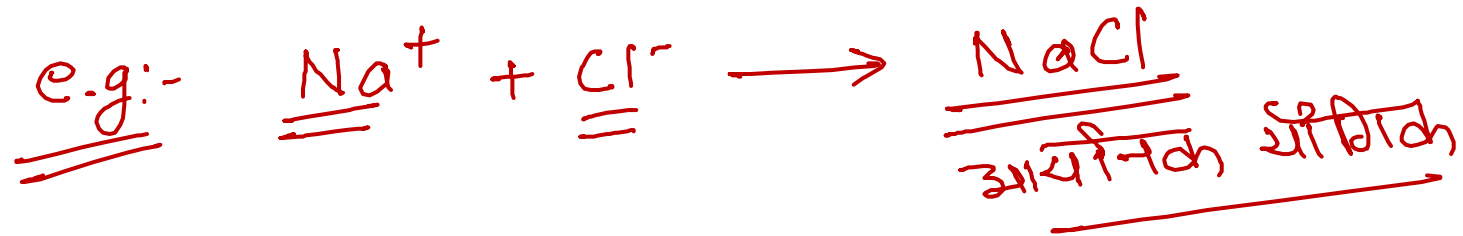
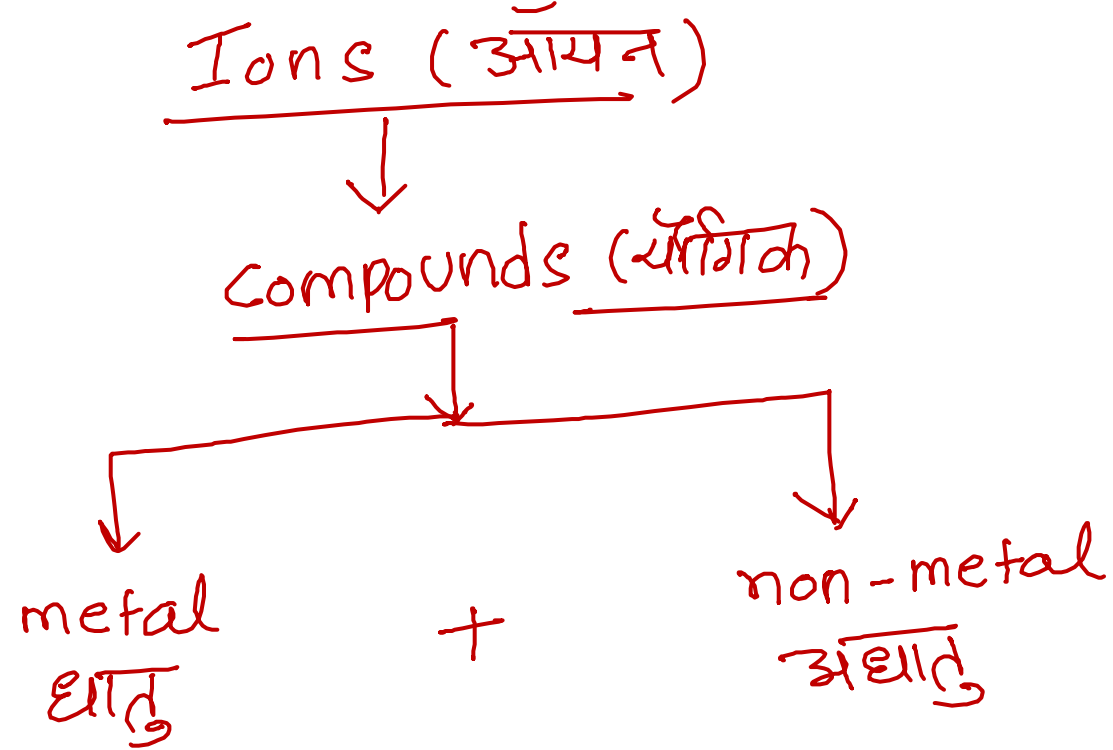
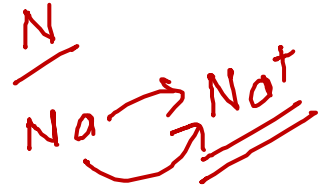


| Table 4.1: Composition of Atoms of the First Eighteen Elements with Electron Distribution in Various Shells |        |               |                   |                    |                     |                           |   |   |   |          |
|-------------------------------------------------------------------------------------------------------------|--------|---------------|-------------------|--------------------|---------------------|---------------------------|---|---|---|----------|
| Name of Element                                                                                             | Symbol | Atomic Number | Number of Protons | Number of Neutrons | Number of Electrons | Distribution of Electrons |   |   |   | Vale-ncy |
|                                                                                                             |        |               |                   |                    |                     | K                         | L | M | N |          |
| Hydrogen                                                                                                    | H      | 1             | 1                 | -                  | 1                   | 1                         | - | - | - | 1        |
| Helium                                                                                                      | He     | 2             | 2                 | 2                  | 2                   | 2                         | - | - | - | 0        |
| Lithium                                                                                                     | Li     | 3             | 3                 | 4                  | 3                   | 2                         | 1 | - | - | 1        |
| Beryllium                                                                                                   | Be     | 4             | 4                 | 5                  | 4                   | 2                         | 2 | - | - | 2        |
| Boron                                                                                                       | B      | 5             | 5                 | 6                  | 5                   | 2                         | 3 | - | - | 3        |
| Carbon                                                                                                      | C      | 6             | 6                 | 6                  | 6                   | 2                         | 4 | - | - | 4        |
| Nitrogen                                                                                                    | N      | 7             | 7                 | 7                  | 7                   | 2                         | 5 | - | - | 3        |
| Oxygen                                                                                                      | O      | 8             | 8                 | 8                  | 8                   | 2                         | 6 | - | - | 2        |
| Fluorine                                                                                                    | F      | 9             | 9                 | 10                 | 9                   | 2                         | 7 | - | - | 1        |
| Neon                                                                                                        | Ne     | 10            | 10                | 10                 | 10                  | 2                         | 8 | - | - | 0        |
| Sodium                                                                                                      | Na     | 11            | 11                | 12                 | 11                  | 2                         | 8 | 1 | - | 1        |
| Magnesium                                                                                                   | Mg     | 12            | 12                | 12                 | 12                  | 2                         | 8 | 2 | - | 2        |
| Aluminium                                                                                                   | Al     | 13            | 13                | 14                 | 13                  | 2                         | 8 | 3 | - | 3        |
| Silicon                                                                                                     | Si     | 14            | 14                | 14                 | 14                  | 2                         | 8 | 4 | - | 4        |
| Phosphorus                                                                                                  | P      | 15            | 15                | 16                 | 15                  | 2                         | 8 | 5 | - | 3.5      |
| Sulphur                                                                                                     | S      | 16            | 16                | 16                 | 16                  | 2                         | 8 | 6 | - | 2        |
| Chlorine                                                                                                    | Cl     | 17            | 17                | 18                 | 17                  | 2                         | 8 | 7 | - | 1        |
| Argon                                                                                                       | Ar     | 18            | 18                | 22                 | 18                  | 2                         | 8 | 8 |   | 0        |

## Atomic Mass and Valency of First 30 Elements

| ELEMENT    | ATOMIC NUMBER | ATOMIC MASS | VALENCY                          |
|------------|---------------|-------------|----------------------------------|
| Hydrogen   | 1             | 1.0079      | (-1), +1                         |
| Helium     | 2             | 4.0026      | 0                                |
| Lithium    | 3             | 6.941       | +1                               |
| Beryllium  | 4             | 9.0122      | +2                               |
| Boron      | 5             | 10.811      | -3, +3                           |
| Carbon     | 6             | 12.0107     | (+2), +4                         |
| Nitrogen   | 7             | 14.0067     | -3, -2, -1, (+1), +2, +3, +4, +5 |
| Oxygen     | 8             | 15.9994     | -2                               |
| Fluorine   | 9             | 18.9984     | -1, (+1)                         |
| Neon       | 10            | 20.1797     | 0                                |
| Sodium     | 11            | 22.9897     | +1                               |
| Magnesium  | 12            | 24.305      | +2                               |
| Aluminum   | 13            | 26.9815     | +3                               |
| Silicon    | 14            | 28.0855     | -4, (+2), +4                     |
| Phosphorus | 15            | 30.9738     | -3, +1, +3, +5                   |
| Sulfur     | 16            | 32.065      | -2, +2, +4, +6                   |
| Chlorine   | 17            | 35.453      | -1, +1, (+2), +3, (+4), +5, +7   |
| Argon      | 18            | 39.948      | 0                                |
| Potassium  | 19            | 39.0983     | +1                               |
| Calcium    | 20            | 40.078      | +2                               |
| Scandium   | 21            | 44.9559     | +3                               |
| Titanium   | 22            | 47.867      | +2, +3, +4                       |
| Vanadium   | 23            | 50.9415     | +2, +3, +4, +5                   |
| Chromium   | 24            | 51.9961     | +2, +3, +6                       |
| Manganese  | 25            | 54.938      | +2, (+3), +4, (+6), +7           |
| Iron       | 26            | 55.845      | +2, +3, (+4), (+6)               |
| Nickel     | 27            | 58.6934     | +2, +3, (+4)                     |
| Cobalt     | 28            | 58.9332     | (+1), +2, (+3), (+4)             |
| Copper     | 29            | 63.546      | +1, +2, (+3)                     |
| Zinc       | 30            | 65.39       | +2                               |

# CHARGED PARTICLES ✓✓



\* Types:-

① Cation (ધનાયન)  $\Rightarrow$  ધાતુ (metal)  $< 4e^-$

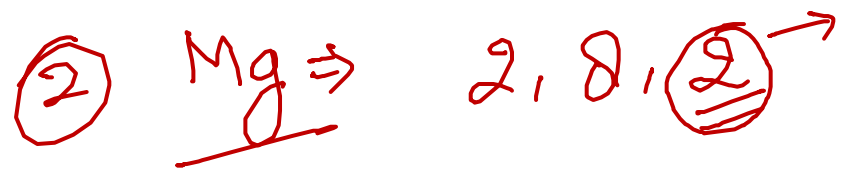
② Anion (અણાયન)  $\Rightarrow$  અધાતુ (nonmetal)  $> 4e^-$

e.g:-

Na  $\Rightarrow$  2, 8, 1  $\Rightarrow$  valance  $e^-$

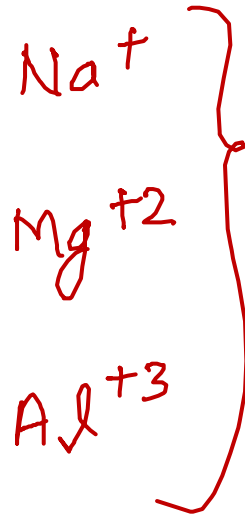
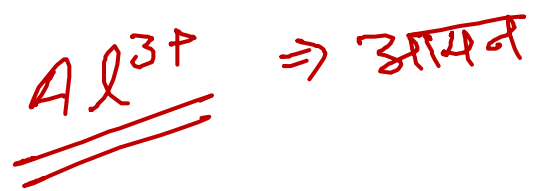
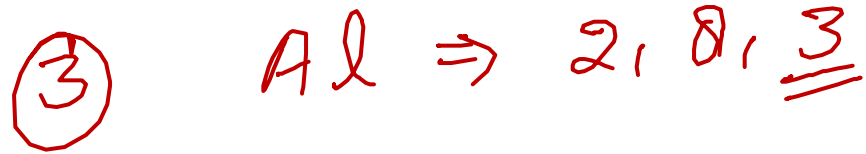
$11e^- = 11p^+$   $\Rightarrow$  octate (અષ્ટક)

2, 8  $\Rightarrow$  Na  $\rightarrow$   $11p^+$   
 $10e^-$  }  $Na^+$   $\Rightarrow$  આયન



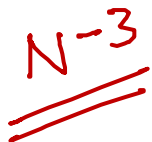
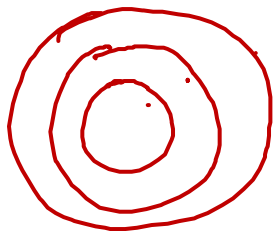
$$12 e^- = 12 p^+$$

$$10 e^- = 12 p^+$$

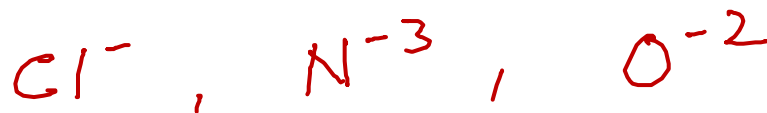
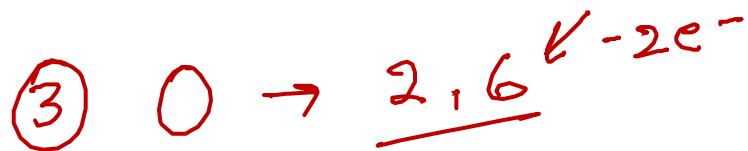


आयन (+ve)

\* non-metal:-



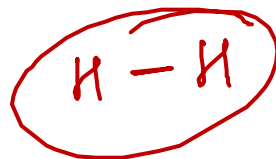
(negative)





\* C, Si  $\rightarrow$  4  $\leftarrow$  4e<sup>-</sup>

C  $\rightarrow$  4  $\leftarrow$  4e<sup>-</sup>



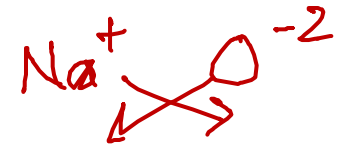
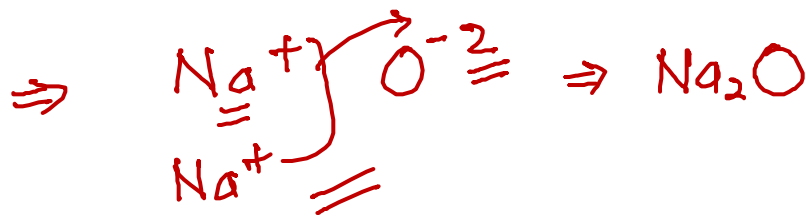
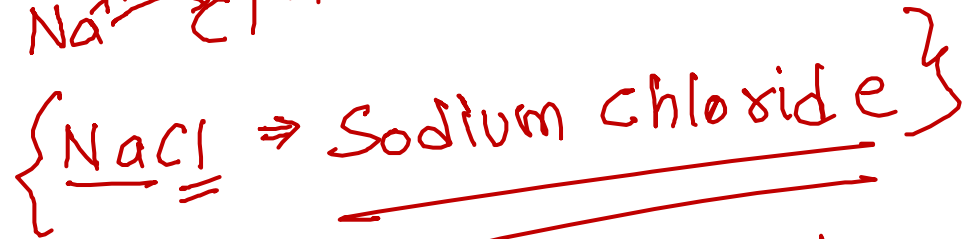
Sharing of e<sup>-</sup> C-C

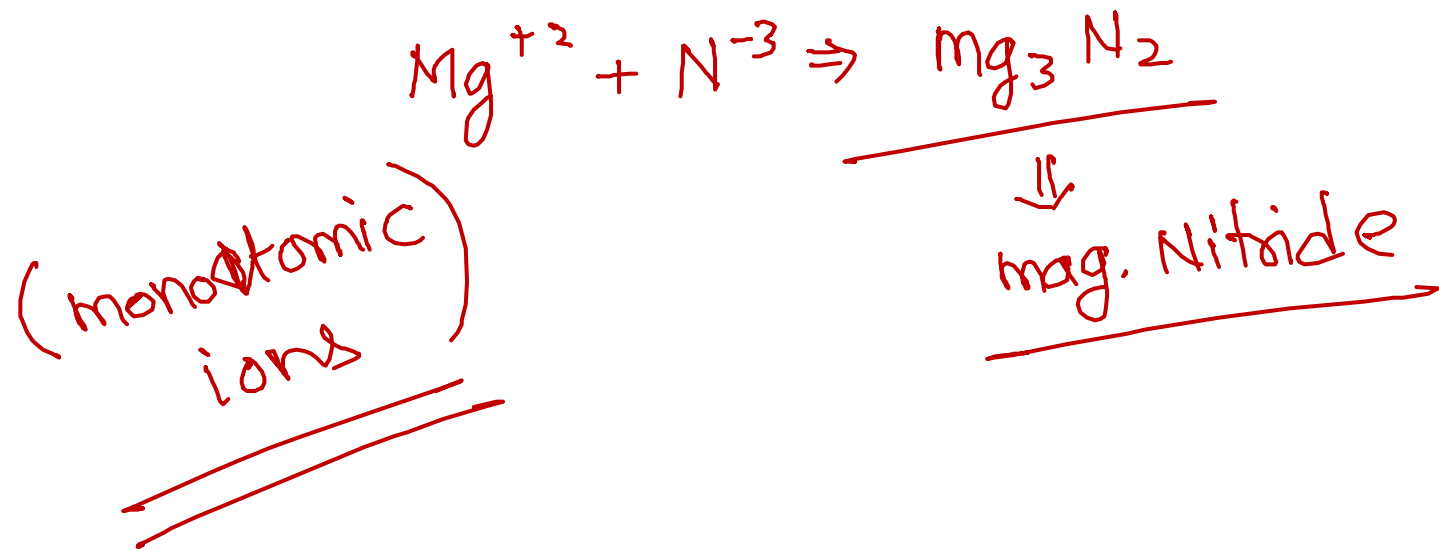
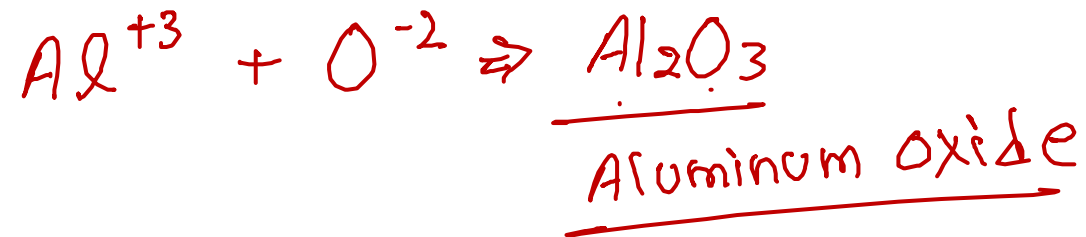
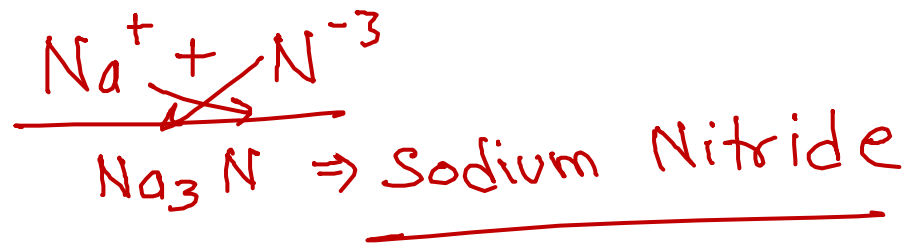
↓  
{ covalent Bond }

ionic Bond:- जहाँ e<sup>-</sup> या तो दो या  
ले लो:

| <u>धातु</u>      | <u>अधातु</u>                                           |
|------------------|--------------------------------------------------------|
| $\text{Na}^+$    | $\text{Cl}^- \Rightarrow \text{Chloride (क्लोराइड)}$   |
| $\text{Mg}^{+2}$ | $\text{O}^{-2} \Rightarrow \text{Oxide (ऑक्साइड)}$     |
| $\text{Al}^{+3}$ | $\text{N}^{-3} \Rightarrow \text{Nitride (नाइट्राइड)}$ |

e.g.:







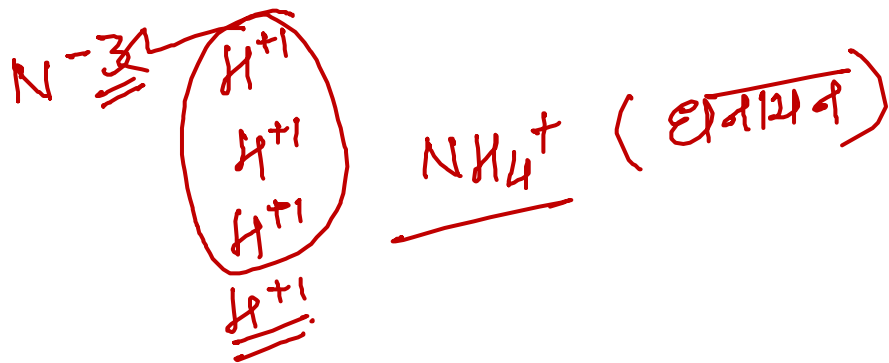




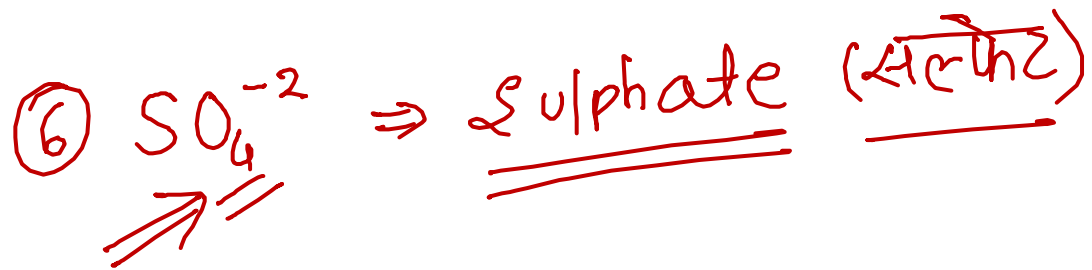
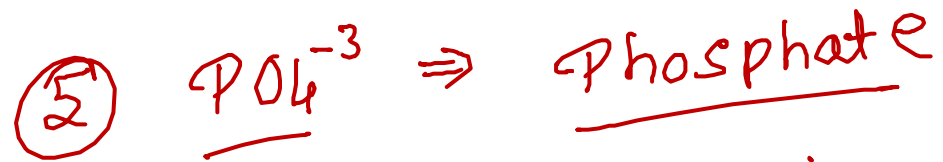
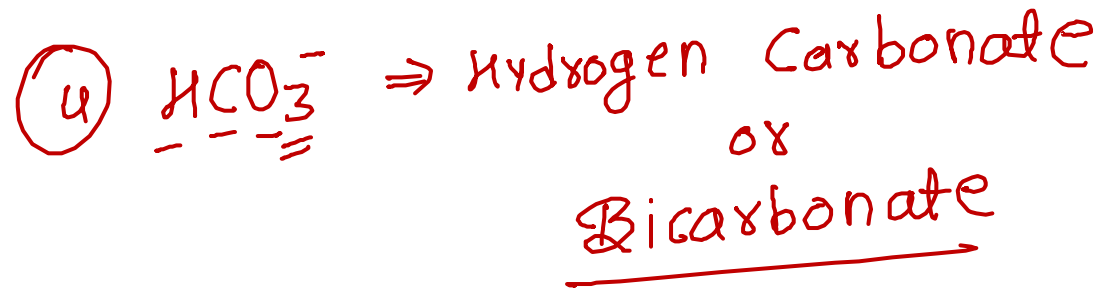
NH<sub>3</sub> ⇒ अमोनिया

## Polyatomic Ions

❧ ① NH<sub>4</sub><sup>+</sup> ⇒ Ammonium



② OH<sup>-</sup> ⇒ हाइड्रॉक्साइड (हाइड्रॉक्साइड) (Anion)



## List of Common Ions

| Monatomic Cations |                                   |           |
|-------------------|-----------------------------------|-----------|
| 1+                | $\text{H}^+$                      | hydrogen  |
|                   | $\text{Li}^+$                     | lithium   |
|                   | $\text{Na}^+$                     | sodium    |
|                   | $\text{K}^+$                      | potassium |
|                   | $\text{Rb}^+$                     | rubidium  |
|                   | $\text{Cs}^+$                     | cesium    |
|                   | $\text{Ag}^+$                     | silver    |
| 2+                | $\text{Mg}^{2+}$                  | magnesium |
|                   | $\text{Ca}^{2+}$                  | calcium   |
|                   | $\text{Sr}^{2+}$                  | strontium |
|                   | $\text{Ba}^{2+}$                  | barium    |
|                   | $\text{Zn}^{2+}$                  | zinc      |
|                   | $\text{Cd}^{2+}$                  | cadmium   |
| 3+                | $\text{Al}^{3+}$                  | aluminum  |
|                   | $\text{Bi}^{3+}$                  | bismuth   |
| Monatomic Anions  |                                   |           |
| 1-                | $\text{H}^-$                      | hydride   |
|                   | $\text{F}^-$                      | fluoride  |
|                   | $\text{Cl}^-$                     | chloride  |
|                   | $\text{Br}^-$                     | bromide   |
|                   | $\text{I}^-$                      | iodide    |
| 2-                | $\text{O}^{2-}$                   | oxide     |
|                   | $\text{S}^{2-}$                   | sulfide   |
| 3-                | $\text{N}^{3-}$                   | nitride   |
|                   | $\text{P}^{3-}$                   | phosphide |
| 4-                | $\text{C}^{4-} (\text{C}_2^{2-})$ | carbide   |

| Polyatomic Cations                                                 |                                      |
|--------------------------------------------------------------------|--------------------------------------|
| $\text{NH}_4^+$                                                    | ammonium ✓                           |
| $\text{H}_3\text{O}^+$                                             | hydronium ✓                          |
| Polyatomic Anions                                                  |                                      |
| $\text{OH}^-$                                                      | hydroxide ✓                          |
| $\text{CN}^-$                                                      | cyanide                              |
| $\text{O}_2^{2-}$                                                  | peroxide ✓                           |
| $\text{CO}_3^{2-}$                                                 | carbonate ✓                          |
| $\text{C}_2\text{O}_4^{2-}$                                        | oxalate                              |
| $\text{NO}_2^-$                                                    | nitrite ✓                            |
| $\text{NO}_3^-$                                                    | nitrate ✓                            |
| $\text{PO}_3^{3-}$                                                 | phosphite                            |
| $\text{PO}_4^{3-}$                                                 | phosphate                            |
| $\text{SO}_3^{2-}$                                                 | sulfite                              |
| $\text{SO}_4^{2-}$                                                 | sulfate                              |
| $\text{S}_2\text{O}_3^{2-}$                                        | thiosulfate                          |
| $\text{ClO}^-$                                                     | hypochlorite                         |
| $\text{ClO}_2^-$                                                   | chlorite                             |
| $\text{ClO}_3^-$                                                   | chlorate                             |
| $\text{ClO}_4^-$                                                   | perchlorate                          |
| $\text{CH}_3\text{COO}^-$<br>or $\text{C}_2\text{H}_3\text{O}_2^-$ | acetate                              |
| $\text{AsO}_4^{3-}$                                                | arsenate                             |
| $\text{BO}_3^{3-}$                                                 | borate                               |
| $\text{SiO}_3^{2-}$                                                | silicate                             |
| $\text{MnO}_4^-$                                                   | permanganate                         |
| $\text{CrO}_4^{2-}$                                                | chromate                             |
| $\text{Cr}_2\text{O}_7^{2-}$                                       | dichromate                           |
| $\text{CHO}_2^-$                                                   | formate                              |
| $\text{HCO}_3^-$                                                   | hydrogen carbonate<br>or bicarbonate |
| $\text{HSO}_3^-$                                                   | hydrogen sulfite<br>or bisulfite     |
| $\text{HSO}_4^-$                                                   | hydrogen sulfate<br>or bisulfate     |
| $\text{HPO}_4^{2-}$                                                | hydrogen phosphate                   |
| $\text{H}_2\text{PO}_4^-$                                          | dihydrogen phosphate                 |



\* ⑦  $S^{-2} \Rightarrow$  ~~Sulf~~ Sulphide  
(सल्फाइड)

⑧  $H^{+} \Rightarrow$  Hydrogen ion

$H^{-} \Rightarrow$  Hydride (हाइड्राइड)

⑨  $Br^{-} \Rightarrow$  Bromide  
 $F^{-} \Rightarrow$  Fluoride  
 $I^{-} \Rightarrow$  Iodide

**Table 2.5** Common Polyatomic Ions\*

| Formula                                | Name                                       |
|----------------------------------------|--------------------------------------------|
| <b>Cations</b>                         |                                            |
| $NH_4^{+}$                             | <b>ammonium</b>                            |
| $H_3O^{+}$                             | <b>hydronium</b>                           |
| <b>Anions</b>                          |                                            |
| $CH_3COO^{-}$<br>(or $C_2H_3O_2^{-}$ ) | <b>acetate</b>                             |
| $CN^{-}$                               | <b>cyanide</b>                             |
| $OH^{-}$                               | <b>hydroxide</b>                           |
| $ClO^{-}$                              | <b>hypochlorite</b>                        |
| $ClO_2^{-}$                            | <b>chlorite</b>                            |
| $ClO_3^{-}$                            | <b>chlorate</b>                            |
| $ClO_4^{-}$                            | <b>perchlorate</b>                         |
| $NO_2^{-}$                             | <b>nitrite</b>                             |
| $NO_3^{-}$                             | <b>nitrate</b>                             |
| $MnO_4^{-}$                            | <b>permanganate</b>                        |
| $CO_3^{2-}$                            | <b>carbonate</b>                           |
| $HCO_3^{-}$                            | <b>hydrogen carbonate (or bicarbonate)</b> |
| $CrO_4^{2-}$                           | <b>chromate</b>                            |
| $Cr_2O_7^{2-}$                         | <b>dichromate</b>                          |
| $O_2^{2-}$                             | <b>peroxide</b>                            |
| $PO_4^{3-}$                            | <b>phosphate</b>                           |
| $HPO_4^{2-}$                           | <b>hydrogen phosphate</b>                  |
| $H_2PO_4^{-}$                          | <b>dihydrogen phosphate</b>                |
| $SO_3^{2-}$                            | <b>sulfite</b>                             |
| $SO_4^{2-}$                            | <b>sulfate</b>                             |
| $HSO_4^{-}$                            | <b>hydrogen sulfate (or bisulfate)</b>     |

\***Boldface** ions are most common.

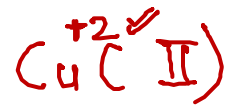
\* ⑩



Copper - I



Cuprous  
(फ़्यूयस)

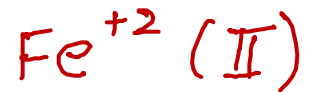


Copper  $\rightarrow 2$



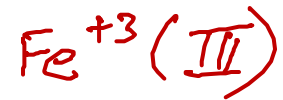
Cupric  
(फ़्यूयस)

⑪



Ferrous

(फेरस)



Ferric

(फेरिक)

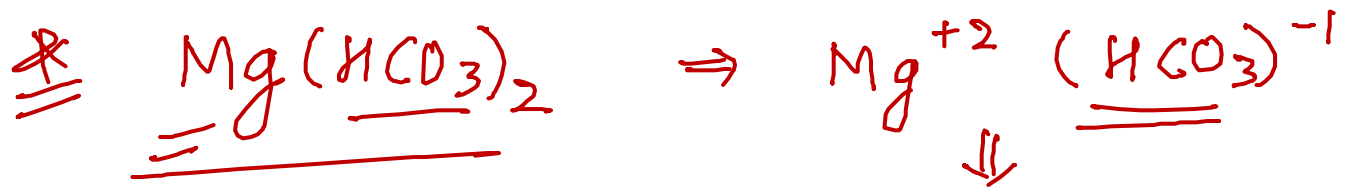
e.g:- MgSO<sub>4</sub>  $\Rightarrow$  Magnesium Sulphate ✓

AlPO<sub>4</sub>  $\Rightarrow$  Aluminum Phosphate

metal + अम्ल

↓

अम्ल compound



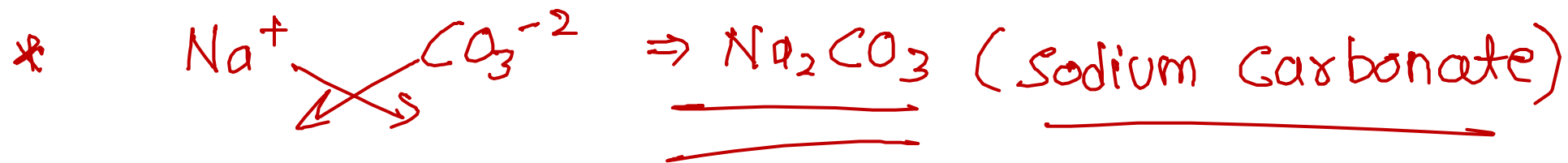
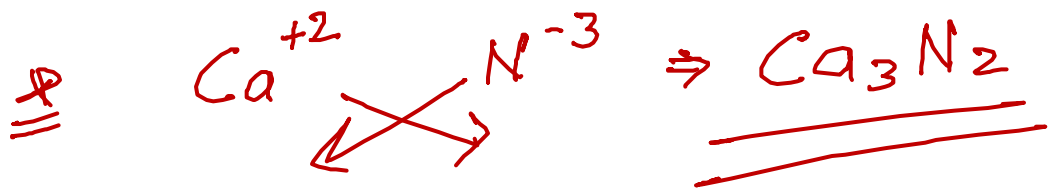
Magnesium Hydrogen  
Carbonate

or  
Magnesium Bi Carbonate



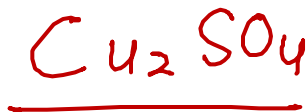


e.g:- Bones,  
Teeth



\*  $\text{CH}_3\text{COOC}_2\text{H}_5 \Rightarrow \text{ester}$

\*/



Copper (I) sulphate

Cuprous sulphate



Copper (II) sulphate

\*

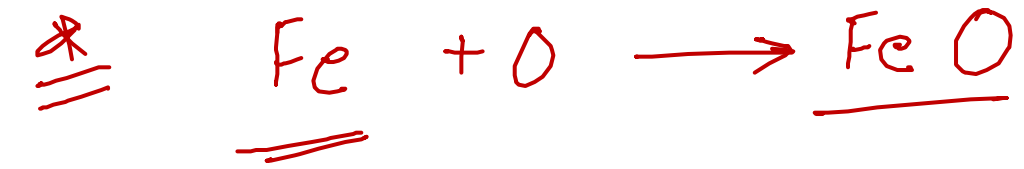


Ferrus Sulphate



Ferric Sulphate

Iron (III) Sulphate



Iron (II) oxide or

ferrous oxide





\* Alum (Fünfsalz)



\* ① Metal + Non-metal

(cation) + (Anion)

(धातुयन) + (अन आयन)

→ Ionic Compound

\* melting point & Boiling Point:- उच्च (High)



ionic ⇒ Strong

## \* Ionic Compound (आयनिक यौगिक):-

- ① Good conductor of electricity in solid form.
- ② " " " " " molten ✓✓
- ③ Bad " " " molten " .
- ④ NOT.

Solution (द्रव्य)



Good Cond.



✓  
विलयन

विद्युत धारा

सु-चासक

\*  $\text{Na}_2\text{CO}_3$   $\Rightarrow$  Sodium Carbonate  
or  
Soda Ash

\*  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$   $\Rightarrow$  Washing Soda (धोवन सोडा)

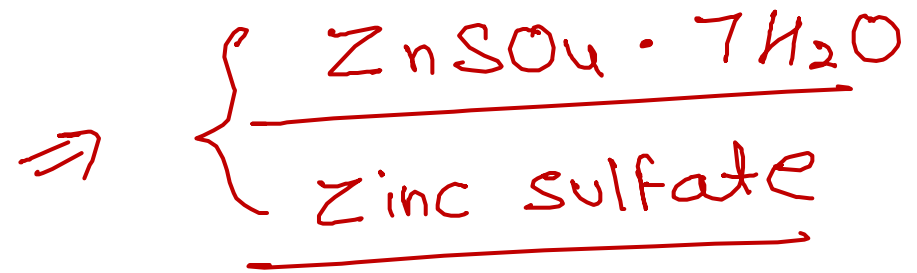
\*  $\text{Na}^+ + \text{HCO}_3^- \Rightarrow \text{NaHCO}_3$   
 $\downarrow$   
Baking Soda (खाने वाला सोडा)  
 $\Rightarrow$  Sodium Bi Carbonate

## \* Imp. Vitriols:-

①  $\text{CuSO}_4 \Rightarrow \text{Copper Sulphate}$

②  $\text{CuSO}_4 \cdot \underline{5\text{H}_2\text{O}} \Rightarrow \text{Blue Vitriol (नीला शोरा)}$   
 $\downarrow$   
Copper Sulphate Penta Hydrate

\* White Vitriol: अफेद शोथा:-



$\Rightarrow$  Water soluble (पानी में घुलनशील)

$\Rightarrow$

\* Green Vitriol:- (દસા ચોથા):-



Iron Sulphate

\* Oil of Vitriol:- Sulphuric Acid  
(H<sub>2</sub>SO<sub>4</sub>)



\* Red Vitriol: (लाल शोया):-



Cobalt Sulphate

\* Sweet oil of Vitriol: -

Diethyl ether



★ દર્શાવો :-

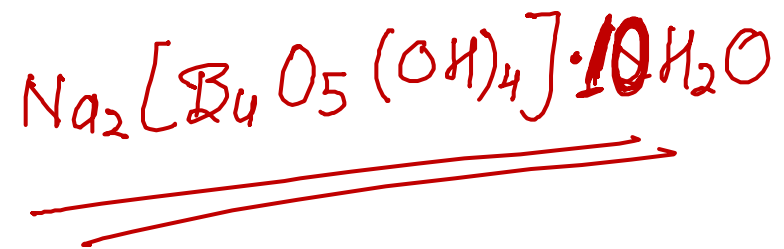
↓  
Ferrous Sulphate



\* अथर्व

↳ Borax

⇒



Sodium tetraborate  
Decahydrate

Ammonium chloride

$\text{NH}_4\text{Cl}$  → अमोनियम क्लोराइड

$\text{Fe SO}_4 \cdot 7\text{H}_2\text{O}$

\* यूरिया → Urea  
↓

$\text{CH}_4\text{N}_2\text{O}$

C





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