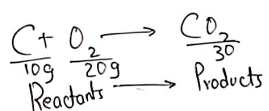Laws of chemical combination.

① Law of conservation of matter

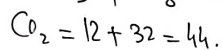$$C + O_2 \longrightarrow CO_2$$
$$\underset{10g}{} \; \underset{20g}{} \longrightarrow \underset{30}{}$$
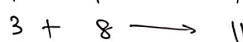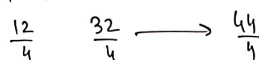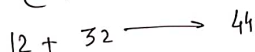Reactants $\longrightarrow$ Products

Reactants = 30g

Product = 30g

Total mass of R = Total mass of P.

---

② Law of constant proportion.

① $C + O_2 \longrightarrow CO_2$

$12 + 32 \longrightarrow 44$

$\dfrac{12}{4} \quad \dfrac{32}{4} \longrightarrow \dfrac{44}{4}$

$3 + 8 \longrightarrow 11$

$CO_2 = 12 + 32 = 44.$

$\boxed{Ratio = 3:8}$

② $2H_2 + O_2 \longrightarrow 2H_2O$
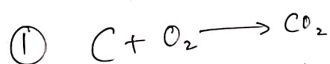
Carbon
P = 6
N = 6
e⁻ = 6

Atomic No. = No. of protons or neutrons = 6

Atomic Mass Number = No. of protons + No. of neutrons

= 6 + 6

= 12.

O
P = 8
N = 8
e⁻ = 8

AMN = O = 16

Laws of chemical combination.

$$2H_2 + O_2 \longrightarrow 2H_2O.$$
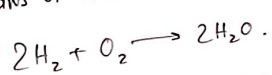
$$4 + 32 \longrightarrow 36$$

$$\frac{4}{4} \quad \frac{32}{4} \longrightarrow \frac{36}{4}$$

$$1 + 8 \longrightarrow 9$$

$H_2O = 2 + 16$

$H_2O = 18$

$2H_2O = 36$

Ratio = 1:8

H
$P = 1$
$\bar{e} = 1$

O
$P = 8$
$N = 8$
$\bar{e} = 8$
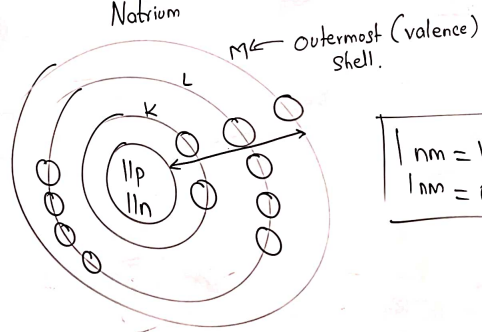
Sub:-

At. Size [Distance between nucleus and outermost shell.] electronic configuration.

Sodium = $Na = 11 = (2,8,1)$

↓
Natrium

M← outermost (valence) shell.

1	2	3	4
K	L	M	N
2	8	18	32

Capacity $= 2n^2$

$1\,nm = 10^{-9}\,m$

$1\,nm = 0.000000001\,m$

Sub:-

Molecular Mass.

$\times$

Molecule	Constituent elements	Atomic mass (u)	No. of atoms in the molecule	Atomic mass × No. of atoms	Mass of constituents
$Ca(OH)_2$ $\downarrow$ Calcium hydroxide	Ca	40	1	40 × 1	40
	O	16	2	16 × 2	32
	H	1	2	1 × 2	2

$= 40 + 32 + 2$

$= 74\ u.$

Sub:-

Molecular Mass.

$$\overset{\times}{\overbrace{}}$$

Molecule	Constituent elements	Atomic mass (u)	No. of atoms in the molecule	Atomic mass × No. of atoms	Mass of constituents
H_2SO_4 ↓ Sulfuric acid	H	1	2	1×2	2
	S	32	1	32×1	32
	O	16	4	16×4	64
					= 2 + 32 + 64
					= 98 u.

Sub:-

Avogadro's Number $\left(N_A\right)$.

I mole = 6.022×10^{23} molecules / particles.
↓
$\boxed{N_A.}$

$\begin{array}{c} \text{I mole of any} \\ \text{Compound} \end{array} = \begin{array}{c} \text{Molecular mass of} \\ \text{the compound.} \end{array}$

Eg I mole of H_2O = 18 g of H_2O.

$CO_2 = (1 \times 12) + (2 \times 16)$
$= 12 + 32$
$= 440.$

Sub:-

1 mole of CO_2 = 44g of CO_2

$\longrightarrow$ 66g of CO_2 = ? mole.

No. of moles = $\dfrac{Mass}{Molecular\ Mass}$ = $\dfrac{\overset{3}{\cancel{66}}}{\underset{2}{\cancel{44}}}$ = $\dfrac{3}{2}$ = $\boxed{1.5\ mol}$

Sub:-

Valency.

① Sodium = Na = 11 = $(2, \overset{\downarrow}{8}, 1)$

$+7(7)$ $\qquad$ $-1(1)$

$(2,8,8)$ $\qquad$ $(2,8)$

$\boxed{\text{Valency} = +1}$

② Chlorine = Cl = 17 = $(2, \overset{\downarrow}{8}, 7)$

$+1(1)$ $\qquad$ $-7(7)$

$(2,8,8)$ $\qquad$ $(2,8)$
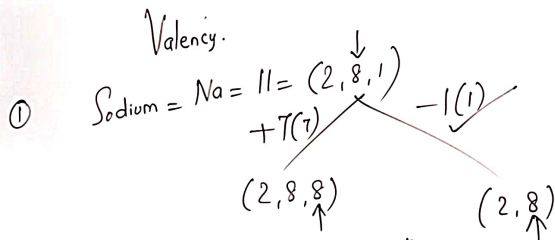
$\boxed{\text{Valency} = -1}$

K L M N
2 8 18 32

$\boxed{\begin{array}{l} 2 - \text{Duplet} \\ 8 - \text{Octet} \end{array}}$
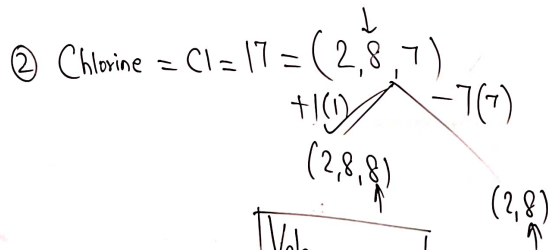
Sub:-

Radicals.

Basic Radicals

$Na = 11 = (2, 8, 1)$

Na donates 1 electron.

$Na = \boxed{Na^+}$

$\hookrightarrow$ cation $(+)$

Acidic radicals.

$Cl = 17 = (2, 8, 7)$

Cl accepts 1 electron.

$Cl \longrightarrow \boxed{Cl^-}$

$\hookrightarrow$ anion $(-)$

Sulfate

$\downarrow$

SO_4^{2-}

$$
\begin{array}{cccc}
K & L & M & N \\
2 & 8 & 18 & 32
\end{array}
$$

2 - Duplet

8 - Octet

Sub:-

Criss cross method.

① Ca ⤢ C H
  +2 ✗ -1
       1

Ca (OH)₂

---

② H ⤢ SO₄
  +1 ✗ -2
  1   2

H₂ SO₄

---

③ Mg   Cl
  +2 ✗ -1
   2   1

$\boxed{MgCl_2}$