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MOLE CONCEPT

Empirical & Molecular formula

It shows the number of atoms of each element in their simple whole number ratio

CH_2O
CH
H_2O

It shows the actual number of atoms of each element present in the compound

eg. $C_6H_{12}O_6$

H_2O

C_6H_6

Qualitative analysis C, H, N

Quantitative analysis %C %H

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	C	H	O
% by mass	42%	10%	48%
let the mass	42 gm	10 gm	48 gm
no. of moles	$\frac{42}{12}$	$\frac{10}{1}$	$\frac{48}{16}$
	3.5	10	3
Simple whole no. ratio	7	20	6

Empirical formula

$C_7H_{20}O_6$

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Q.

	C	H	O	N	
find	30%	10%	32%	28%	by mass
E.F	30gm	10gm	32	28	
moles	$\frac{30}{12}$	$\frac{10}{1}$	$\frac{32}{16}$	$\frac{28}{14}$	
	2.5	10	2	2	
	5	20	4	4	

$$C_5H_{20}O_4N_4$$

Q.

C	H	S	O
20%	25%	30%	25%

by mol

find E.F.

20 mol	25 mol	30 mol	25 mol
4	5	6	5

$$C_4H_5S_6O_5$$

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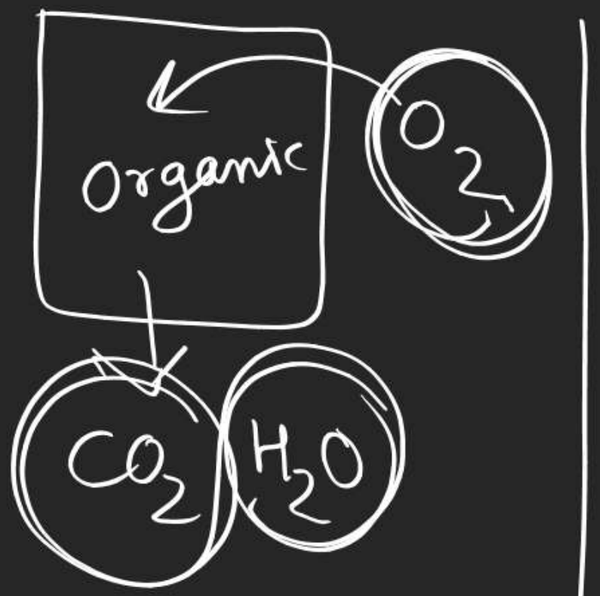
Q. 72 gm organic compound is burnt which produces 220 gm CO_2 & 108 gm H_2O. find E.F.



CO_2	H_2O
220 gm	108
$\frac{220}{44}$ mol	$\frac{108}{18}$ mol
5 mol	6 mol

C	H
5 mol	12 mol

C_5H_{12}

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Q. 104 gm organic comp is burnt which produces 220 gm CO_2 & 108 gm H_2O. find EF

5 mol 6 mol

C	H	O
5	12	
60 gm	12 gm	32 gm
5	12	2

104 - 60 - 12

= 32 gm

$C_5H_{12}O_2$

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EF

$C_5H_{12}O_2$

To determine Molecular formula from empirical formula

→ Molar mass of compound may be given

e.g let Molar mass = 312 gm

E.F ⇒ $C_5H_{12}O_2$ Mol. formula

Mol. formula = n × (E.F.)

$C_{15}H_{36}O_6$ M.F

= V.D may be given

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→ actual number of 'C' atoms may be given

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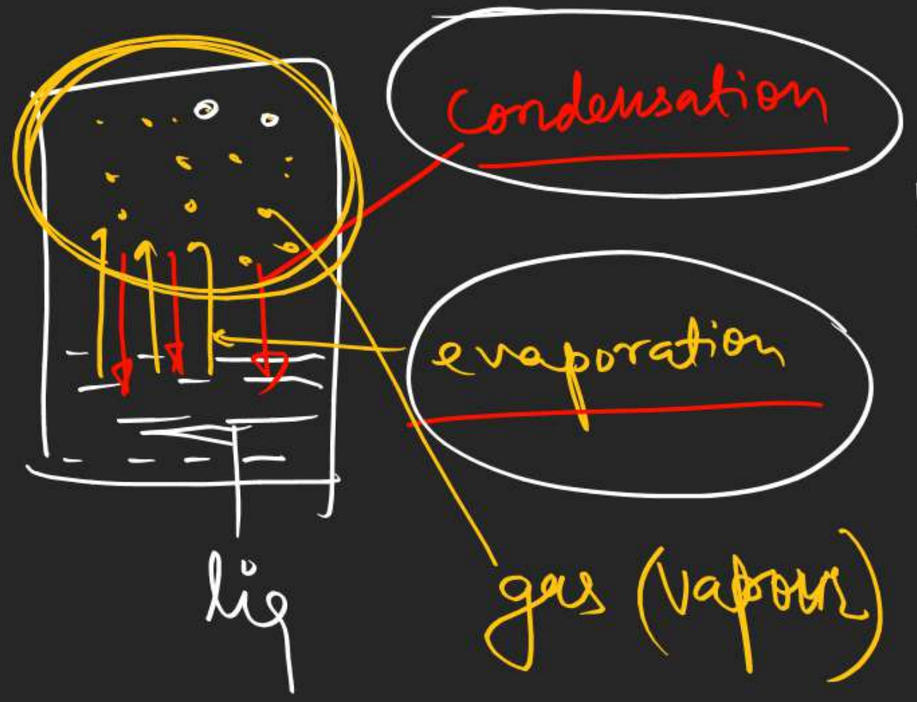
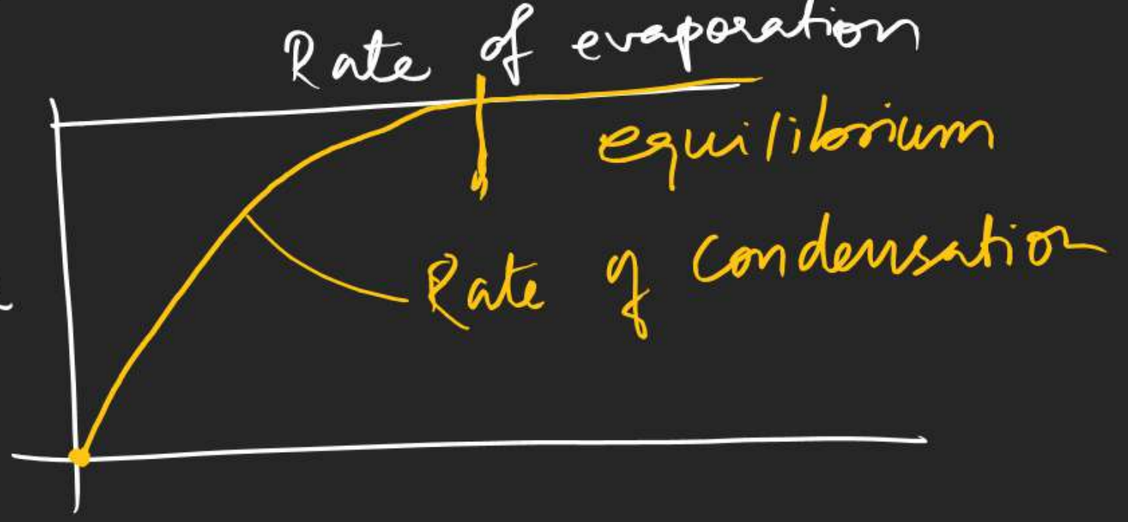
Vapour pressure of Liquid :



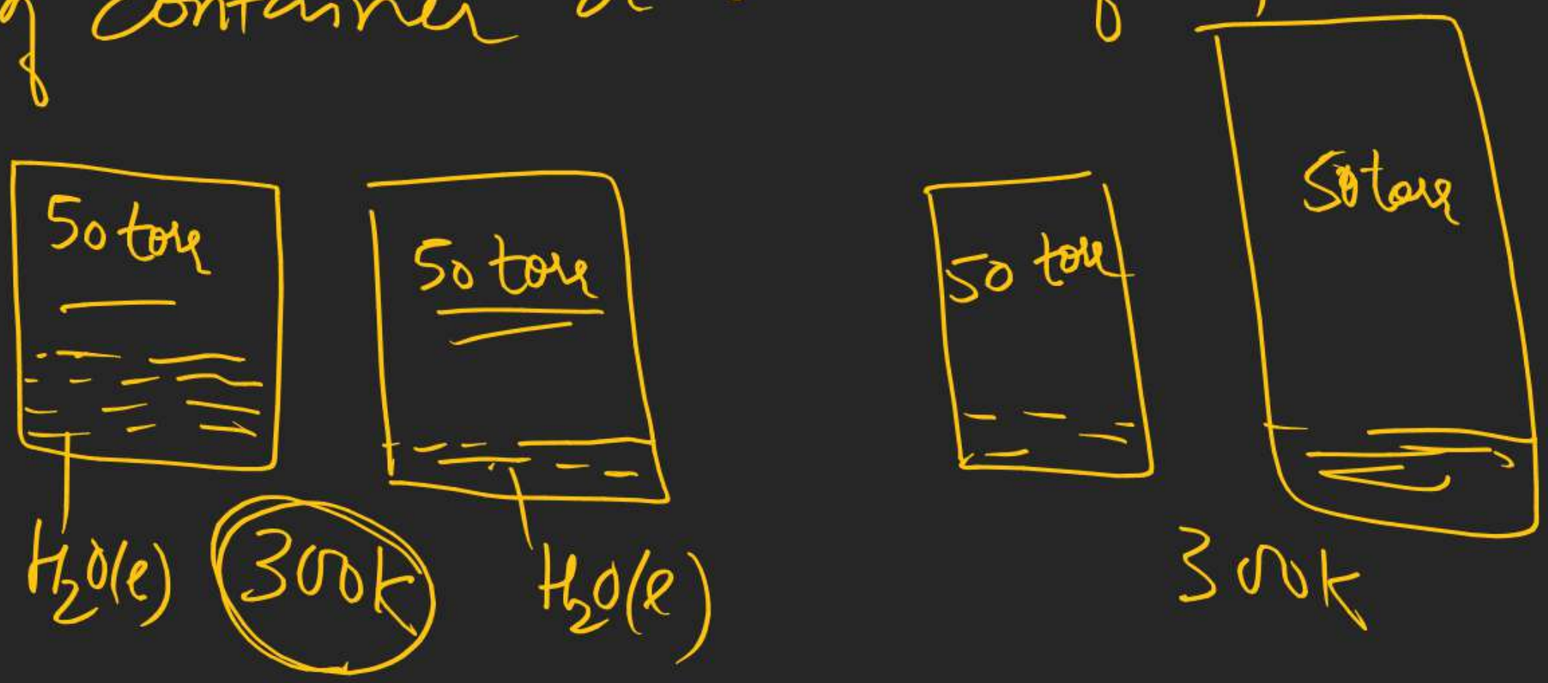


gas (vapour) at eq$^{lb^m}$ P_{cont} = vapour pressure of liq

Pressure exerted by the vapours in eq$^{lb^m}$ with its liquid state

Vapour pressure of a given liquid depends only on temperature.

$\Rightarrow$ Vap. pressure of a given liq is independent of size of container or amount of liquid present



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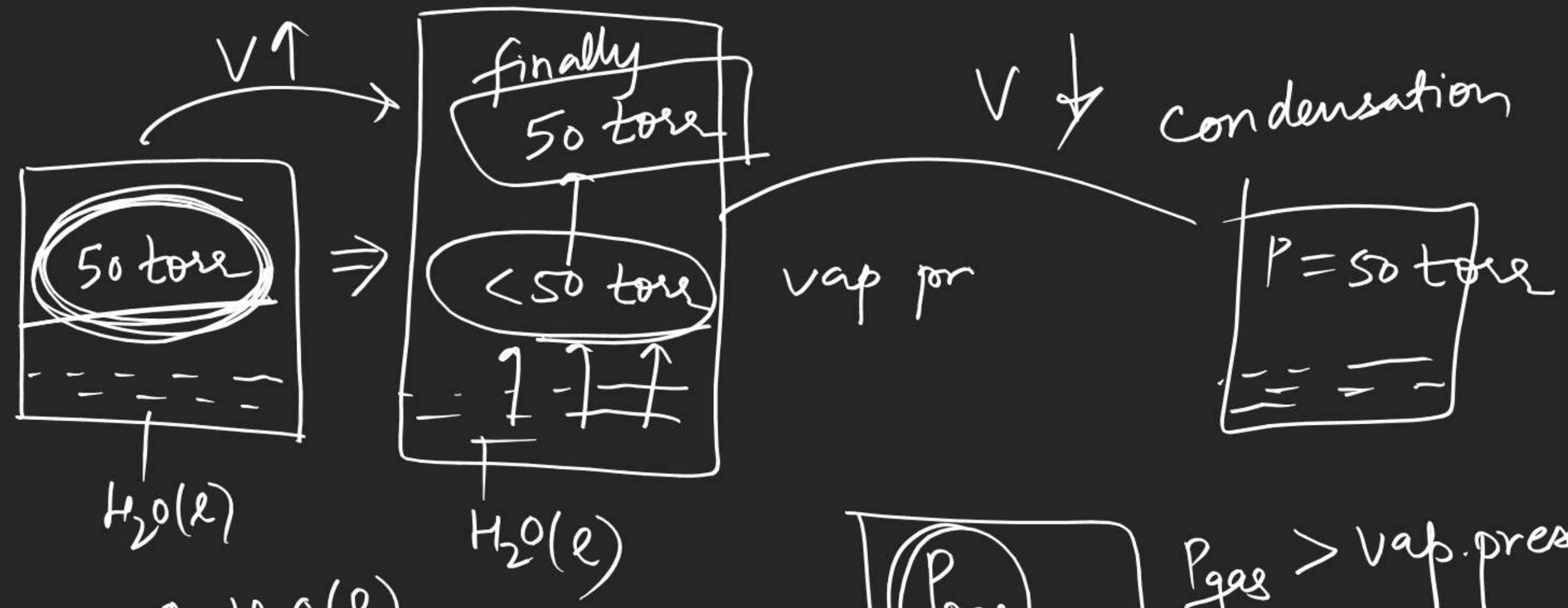

In case of $H_2O(\ell)$

vapour pressure = aqueous tension

P_{gas} > vap. pressure
Condensation

P_{gas} < vap. pressure
evaporation

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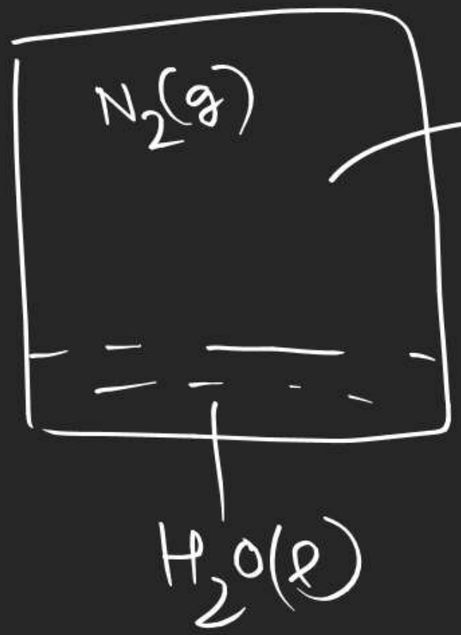

$P_{Total} = P_{N_2}$ + vapour pressure of H_2O

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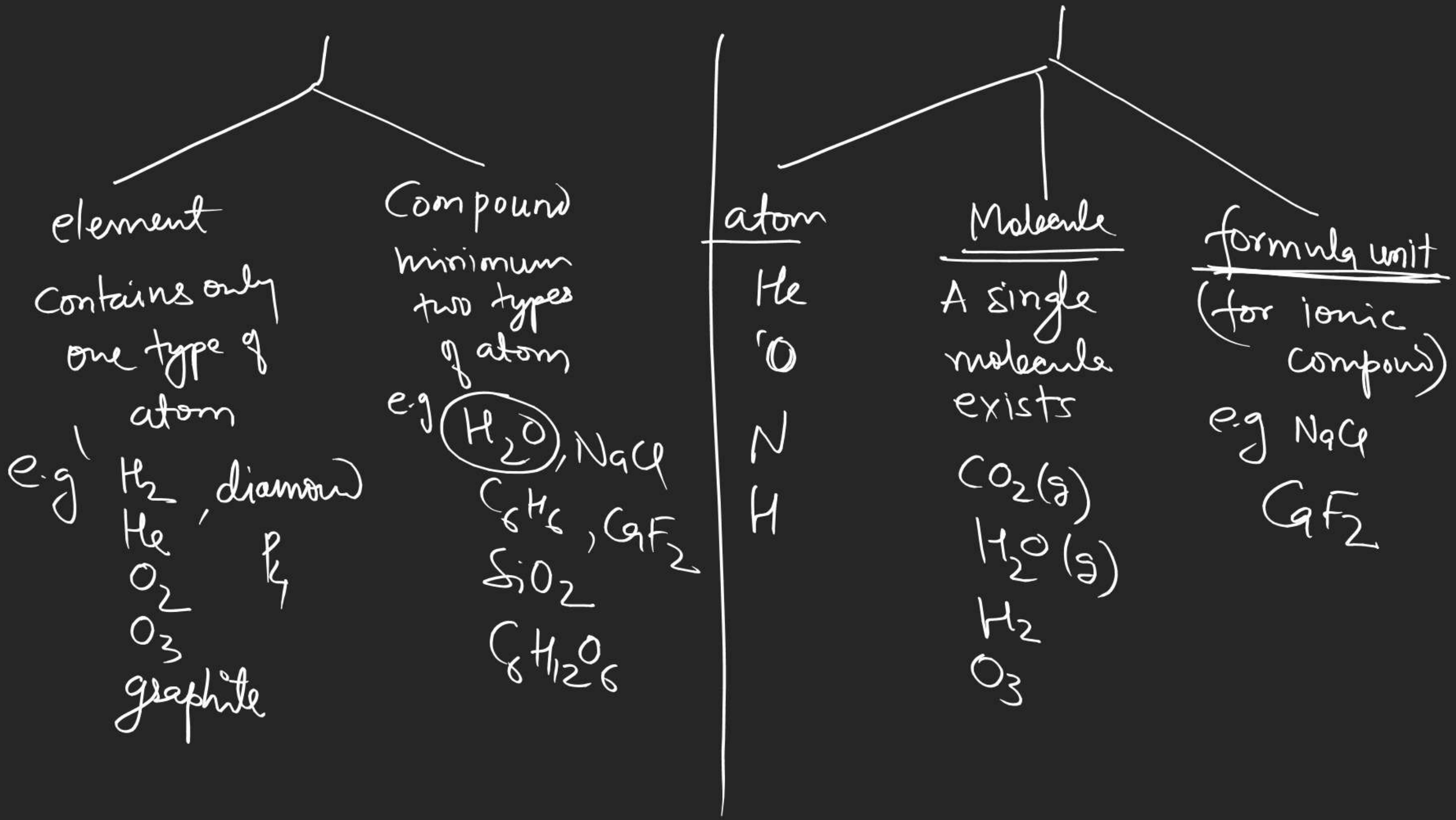

phase change

includes both
state change
and allotropic change

state < solid, liq, gas

rhombic, monoclinic are allotropes

graphite(s) ⇌ diamond(s)

phase change ✓
State change ✗

O, O_2, O_3

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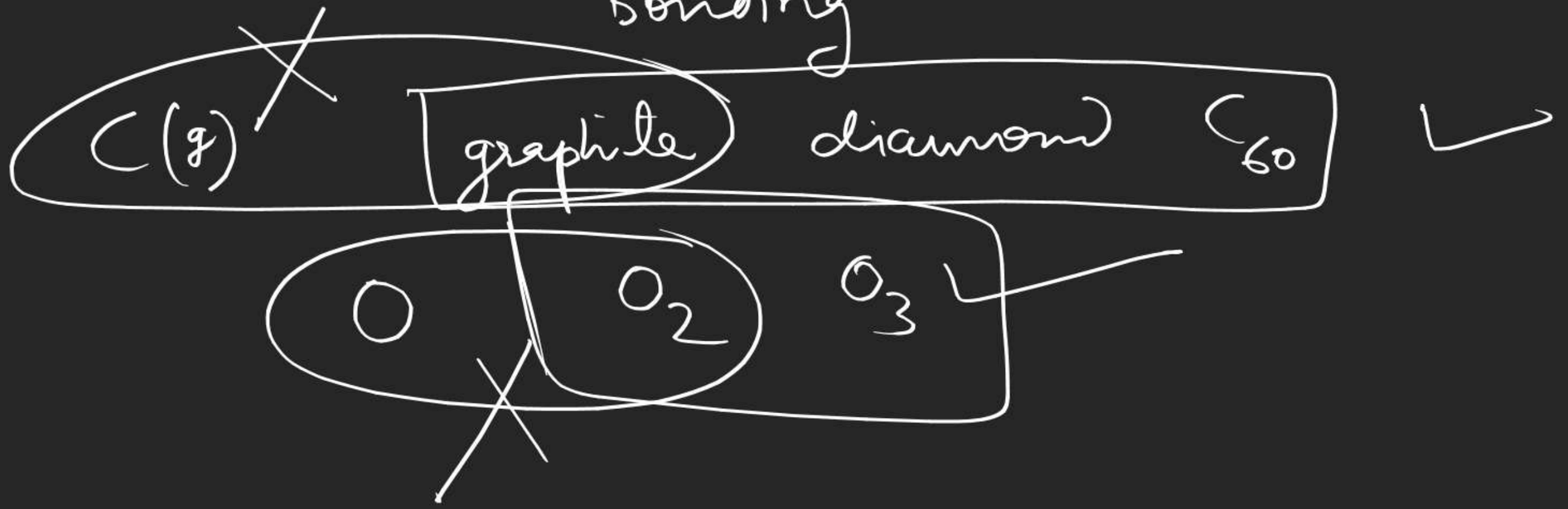
allotropes ⇒ Elements having different type of Bonding



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