لا تنتظر مني ما لا أجده فيك

Subject Chemistry (107)

Class Name

PAGE	DESCRIPTION
	Dr. Fedaa
	Ruba Amjad Taha.

"Subject" chapter 8 " Date ٢٠٢٠ / ١١ / ١٠ No.

Atomic no. = no. of e^- = ~~no. of proton~~

C

12.01 → Atomic mass = no. of proton + no. of ~~neutron (N)~~

* Isotopes :- elements with different no. of neutron or atomic mass

* Calculat the average atomic mass 12.01 of carbon which exist in nature as two Isotop ^{12}C (90%) and ^{13}C (10%)

$$\frac{90}{100} * 12 + \frac{10}{100} * 13 = 12.2$$

Mole : unit to describe the number of something.

$O_{2(g)}$, $H_{2(g)}$, H_2O ⇒ molecules O , H ⇒ atomes

$N_{2(g)}$, $Cl_{2(g)}$, $Ne_{(g)}$, $Ar_{(g)}$

$1 mol = 6.022 \times 10^{23}$ things, molecules, atomes, particales.

* How many molecules in 5 mol H_2O

1 mol ⇒ $6.022 * 10^{23}$ molecules

5 mol ⇒ x

$x = 5 * 6.022 * 10^{23}$ molecules

NOTEBOOK

Scanned with CamScanner

Subject   Date   No.

* which one is heavier of 1 mole ~~A/B~~ having 6.022×10^{23}

(A) 1 mol H_2O

(b) CO_2

(C) Br_2

(D) all of ~~the~~ are same -

* How many of atomes in 5 mol of H_2O

(d)

1 molecules H_2O = 3 atomes

$x = 5 * 6.022 * 10^{23} * 3$ atomes.

* عند لو سألتك $C_6H_6O_2$ ... كم atomes *

جب : ١٤

$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$

2 mol H_2 + 1 mol O_2 → 2 mol of H_2O

2 molecules H_2 + 1 molecules O_2 → 2 molecules of H_2O

4 atomes H + 2 atomes O → 6 atomes (H_2O)

NOTEBOOK

Scanned with CamScanner

Subject $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O$ Date No.

* How many mole of H_2O produced by 6 mol O_2

1 mol $O_2 \longrightarrow$ 2 mol H_2O

6 mol $O_2 \xrightarrow{x}$ x

$x = 12$ mol H_2O

b) How many mole of H_2 required to react with 6 mol O_2.

1 mol $O_2 \longrightarrow$ 2 mol H_2

6 mol $\longrightarrow$ X

$x = 12$ mol of H_2 required

Subject Stoichiometry Date No.

① mole (A) $\longrightarrow$ mole of (B) $\longrightarrow$ 1 step

② mol (A) $\longrightarrow$ mass g of (B)
mass of A $\longrightarrow$ mol of B } 2 stepes

③ mass of A $\longrightarrow$ mass of (B) $\longrightarrow$ 3 stepes

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

If you have 3 mol of O_2, what the mass (g) of SO_3 will be obtained

1 mol O_2 $\longrightarrow$ 2 mol SO_3
3 mol O_2 $\longrightarrow$ x
$x = 6$ mol SO_3

$mt = \frac{mass}{mol}$

$mt(SO_3) = 32 + 16/3 =$ 80 g / mol

total atomic mass

$80 = \frac{mass (g)}{6}$

mass = 480 g

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

if you have 3g of O_2, what the mol of SO_3 will be obtained.

1 mol O_2 $= \frac{mass}{mt}$

$= \frac{3}{(2 \times 16)} = 0.093$ mol

1 mol O_2 $\longrightarrow$ 2 mol of SO_3
0.093 $\longrightarrow$ x

$x = 0.093 \times 2$ mol SO_3

NOTEBOOK

Subject Date No.

* 3g of A → g of B (3steps)

$$2mg_{(s)} + O_2 \xrightarrow[\Delta]{heat} 2mgO_{(s)}$$

IF you burned 1(g) of Mg, what is the mass of $MgO_{(s)}$ will collected

At. Mg = 24.03 g/mol

At. O = 16g/Mol

① mol mg = $\frac{1g}{24 g.mol^{-1}}$ = 0.04mol

mt MgO = 24 + 16 = 40g/mol

2mol Mg → 2mol MgO

0.04mol mg → x

x = 0.04 mol

3 Mass MgO = 0.04 mol * $\frac{40g}{mol}$ = 1.6g

$$CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_2 + 2H_2O_{(l)}$$

2g

IF you intered in the reaction with 2g of CH_4, How much of (g) of O_2 required

At. c = 12g/mol

At. O = 16g/Mol

At. H = 1g/mol

Subject Date No.

① g of CH_3 → mol of CH_4

$Mt(CH_4) = 12 + 9(1) = 16 g/mol$

mol $CH_4 = \frac{2g}{16 g/mol} = 0.125 mol$

② mol CH_4 → mol O_2

1 mol of CH_4 → 2 mol O_2

0.125 mol CH_4 → x

$x = 0.250$ mol O_2

* Calculate the % H and % O in H_2O

Atm H = 1 g/mol

no. of atoms

$\% H = \frac{\text{atomic mass (H)} \cdot n}{Mt(H_2O)} * 100\%$

$\frac{2*1}{(2*1+16)} * 100\% = 11.1\%$

$\% O = \frac{1*16}{18} * 100\% = 88.9\%$

$C_6H_6O_2$ calculate % C, % O, % H

$Mt\ C_6H_6O_2 = (6*12 + 6*1 + 2*16)$

$= 110 g/mol$

$\% C = \frac{6*12}{110} * 100\%$ $\% O = \frac{16*2}{110} * 100\%$

=

NOTEBOOK

$\% H = \frac{6*1}{110} * 100\%$ =

Scanned with CamScanner

Subject Date No.

IF you have 2g of "H" and 5g. of H_2O ...

%H ??

$$\%H = \frac{2}{5} * 100\%$$

الثلاثاء ١٤ ١٢ ٢٠٢٠

* Empirical Formula. الصيغة البنائية
  - The simplest mol ratio of atomes within molecules

* Molecular Formula : الصيغة الجزيئية
  - multi of empirical Formula dimer (2) or trimer (3) ...

آخر قسمة بالمعادلة $\frac{P_4O_{10}}{2} = P_2O_5$

molecular → P_4O_{10}, Emprical → P_2O_5

$$\frac{C_6H_{12}}{2} = \frac{C_3H_6}{3} = CH_2$$

molecular, Emprical

---

* Ascorbic Acid composed of 40.5% C, 4.6% of H, 59.5% O By mass, Find the emprical Formula. * المطلوب الصيغة البنائية

① $$mol\ C = \frac{40.5\ g}{12\ g.mol} = 3.4\ mol$$

$$mol\ O = \frac{59.5\ g}{16\ g.mol} = 3.4\ mol$$

$$mol\ H = \frac{4.6}{1} = 4.6\ mol$$

NOTEBOOK

Subject Date No.

$C_{3.4}\ H_{4.16}\ O_{3.4}$ القسمة على عدد مولات
$\overline{\quad\quad\quad\quad} \div 3.4$

$CH_{1.3}\ O$ لما مش مقبولة بنضرب بعدد

$(CH_{1.3}O) * 2$ مثلاً

$\rightarrow C_2 H_{2.6} O_2$
غير مقبولة

$(CH_{1.3}O) * 3 \rightarrow C_3 H_{3.9} O_3$
مقرب =

$C_3 H_4 O_3$

A compound combust to give 30% of N and 70% of O, in seperal experiments the molecular wiegh of molecular Formula calculated with Ave 90 to 94 g/mol Find the molecular Formula.

$$Av.\ Mt = \frac{90+94}{2} = 92\ g/mol$$

الحل

$$mol\ N = \frac{30}{14\ g/mol} = 2.14\ mol$$

$$mol\ O = \frac{70}{16} = 4.4\ mol$$

$$\frac{N_{2.14}\ O_{4.4}}{2.14} \approx NO_2$$

$* \ Mt\ \underset{\text{Empriral Formul}}{(NO_2)} = 14 + 32 = 46\ g/mol$

$$* \ \frac{Mt\ (\text{molecular formul})}{Mt\ (\text{emp...})} = \frac{92}{46} = 2$$

$*$ molecular Formula $= 2 * (NO_2)$
N_2O_4

NOTEBOOK

Scanned with CamScanner

Subject Date No.

Iron exist in nature as Fe_2O_3, How many Kg of Fe in 50 Kg Fe_2O_3

يوجد طريقتين

الأولى حساب النسبة

$$* \quad \% Fe = \frac{56\ g/mol * 2}{56 * 2 + 16 * 3} * 100\% = 70\%$$

$$mass\ Fe = \frac{70}{100} * 50\ Kg = 35\ Kg$$

الطريقة الثانية

تحويل kg لـ g

$$50\ kg\ Fe_2O_3 \xrightarrow{\text{خطوات}} g\ of\ Fe_2O_3 \rightarrow mol\ Fe_2O_3 \rightarrow mol\ Fe \rightarrow g\ of\ Fe \rightarrow kg\ Fe$$

Subject Date Ec. 1c 17 No. الخميس

A combust of 11.5 g of Ethanol to collect 22g of CO_2 and 11.5g of H_2O

$$C_x H_y O_z \xrightarrow[\Delta]{O_2} CO_2 + H_2O$$
11.5 g 22g 11.5g

* Find the empirical Formula

(* 1 mol $CO_2 \rightarrow$ 1 mol C)

① mol C = mol CO_2 = $\frac{22g}{(12+32)g.mol^{-1}}$ = 0.5 mol

* 1 mol $H_2O \rightarrow$ 2 mol H

② mol H = 2 * mol H_2O = 2 * $\frac{11.5}{18}$ = 1.5 mol

③ Mass O = sample's mass − (mass C + mass H)

= 11.5 − (0.5 $\cancel{mol}$ * $\frac{12g}{\cancel{mol}}$ + 1.5 $\cancel{mol}$ * $\frac{1g}{\cancel{mol}}$)

= 4g

mol O = $\frac{4 g}{16 g.mol}$ = 0.25 mol O

$\frac{C_{0.5} H_{1.5} O_{0.25}}{0.25} \Rightarrow C_2H_6O$

N O T E B O O K

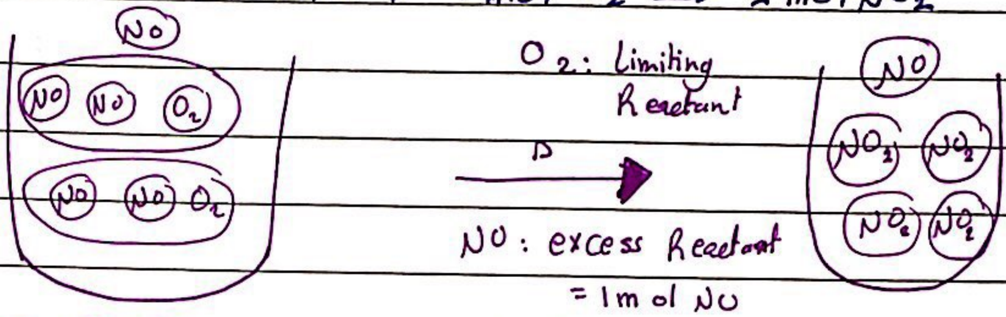
Scanned with CamScanner

Subject　　　　　　　　　　　　　　　　Date　　　　　No.

Limiting Reactant　　العامل المحدد

$$2NO_{g} + O_{2g} \longrightarrow 2NO_{2g}$$

$$2\,mol\,NO + 1\,mol\,O_2 \longrightarrow 2\,mol\,NO_2$$



س) $2NO_{g} + O_{2g} \longrightarrow 2NO_{2g}$

IF you have 4 mol NO and 4 mol O_2, How many mole of NO_2 will produce?

$$2NO + O_2 \longrightarrow 2NO_2 \longrightarrow x = 4\,mol\,NO_2$$

نقسم ع المعامل

	NO	O_2	NO_2
	$\frac{4\,mol}{2}$	$\frac{4\,mol}{1}$	x
	2	4	
	L.R	excess	

$2 < 4$

الرقم الأصغر هو العامل المحدد والأكبر هو الفائض

نجيب الفائض　$4 - 2 = \underline{2\,mol\,O_2}$

من العلاقة مع NO

$2\,NO \longrightarrow 2\,NO_2$

$4\,NO \longrightarrow x$

$x = 4\,mol\,NO_2$

% yield : $\frac{\text{Actual yield}}{\text{Therotical yield}} * 100\%$

يجب أن تكون أكبر من Actual

Therotical yield → calculated account on the L.R

NOTEBOOK

Subject Date ح.م ١٠/٩ الأربعاء No.

Example L.R

$TiCl_{4(g)} + 2Mg_{(l)} \rightarrow Ti_{(s)} + 2MgCl_2$

In industrial scal the experiment start with 1.5×10^3 g of $TiCl_4$ and 3.5×10^3 $Mg_{(l)}$

① calculate the Therotical yield of $MgCl_2$

② calculate the excess mass

③ calculate the % yield of $MgCl_2$ if you got in real 90 g of $MgCl_2$ = Actual.

* $TiCl_4 + 2Mg \rightarrow Ti + 2MgCl_2$

$\frac{1.5 \times 10^3 g}{(48 + 4 \times 35.5) g.mol^{-1}}$ $\frac{3.5 \times 10^3 g}{24\ g.mol^{-1}}$

* L.R

نقسم على المعامل *

$\frac{7.8 mol}{1} < \frac{145 mol}{2}$ → excess

والرقم الأصغر يكون Limitted

الأكبر excess

~~* mole Mg = $\frac{145}{2}$ - 7.8 = 64.7 mol~~ ضرب في الماسة

~~Mass = 64.7 × 24~~

* Therotical Mol ⇒ 1 mol $TiCl_4$ → 2 mol $MgCl_2$

7.8 mol → ??

x = 15.6 mol $MgCl_2$

Therotical Mass = 1.56 mol × (24 + 35.5 × 2) = 1482 g

Subject Date No.

* % yield = $\frac{90}{1482} \times 100\%$

$= 6.2\%$

$2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$

IF you have 6 molecules of H_2 reacted with 2 molcules of O_2. How many mole of H_2O you will get

excess L.R

$2H_2 + O_2 \longrightarrow H_2O$

$\frac{6 \text{ molecules}}{2} > \frac{2 \text{ molecul.}}{1}$

1 molecules $O_2 \longrightarrow$ 2 molecules H_2O

$2 \longrightarrow x$

$x = 4$ molecule H_2O

ex باقي

$6 - (4 \text{ reacted}) = 2$

1 mole $\longrightarrow 6.022 \times 10^{23}$

$x \longrightarrow 4$ molecules

$x = \frac{4}{6.022 \times 10^{23}}$ mol $\quad 10^{23}$

NOTEBOOK

Subject ch.5 Gas Date ح.ث. ١٥/١٩ الثلاثاء No.

* Assume the shape and volume of it's container.
* density of Gas lower than the soild and Liquied.
* Gas distributed in uniform way. (independent behaiver)
* is The most compersable state. mixtur يمكن تعبئة بسهولة

Gas $\xrightarrow{model}$ Ideal gas → $PV = nRT$

(1) infinit volume
(2) There are no interaction between the particals (independent)

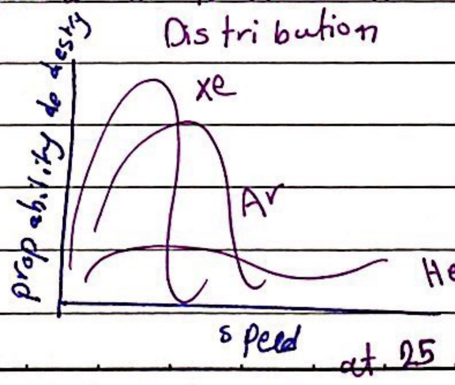
P: pressure
1 atm = 1 barr = 760 mmHg
n: moles number
T: Tempreture (K) كلفن

* 1 atm → 760 mmHg
مثال → X → 800 Hg
* 1 bar = 1 atm
تقريبا

R = gas constant
= 0.0821 atm.L / mol.K

V: volum (L)

Maxwill Boltzman Distribution



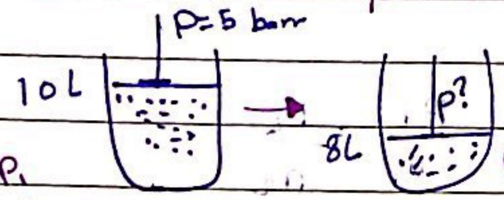
at 25

* Kinetic molecular theory

T↑ → kinetic energy ↑ → speed ↑

* Boyle's Law

$P \propto \frac{1}{V}$ علاقة عكسية



P_1 V_1 P_2 V_2

$P = \text{constant} \cdot \frac{1}{V}$

* كل ما زاد الضغط قل الحجم

لازم ال constant يكونوا مع بعض

$P_1 V_1 = P_2 V_2$

$5\,\text{bar} \times 10\cancel{L} = P_2 \times 8\cancel{L}$

$P_2 = 6.25\ \text{bar}$

اذا مكتوب بدها ياها بوحدة MM Hg

↳ $6.25\ \cancel{\text{bar}} \times \frac{760\ \text{mm Hg}}{1\ \cancel{\text{bar}}}$

Charl's Law

$V \propto T$

$V = \left(\frac{nR}{P}\right)_{\text{constant}} \cdot T$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$P \propto T$

$P = \left(\frac{nR}{V}\right) \cdot T$ ↳ constant

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$

Subject   Date   No.

* Avogadro's Law

$V \propto n$

$V = \left(\frac{RT}{P}\right)_{\text{constant}} \cdot n$ | $\frac{V_1}{n_1} = \frac{V_2}{n_2}$

$P \propto n$

$P = \left(\frac{RT}{V}\right)_{\text{Constant}} \cdot n$ | $\frac{P_1}{n_1} = \frac{P_2}{n_2}$

* Volume at STP (Standard Temprature and pressure)

$T = 0^\circ C \Rightarrow 0^\circ C + 273 = 273\,K$

$P = 1\ atm$

$V = 22.4\,L$

1mol $\rightarrow$ 22.4 L

(1mol, 16g, 22.4L)

(1mol N_2, 28g, 22.4L)

(1 mol O_2, 32g, 22.4L)

Subject | Date ١٤/١٤ الخميس | No.

* calculate the volume accupied by 3g of N_2 at STP mt N_2 = 28 g/mol

Tp = zero, P = 1 atm

$$PV = nRT$$

P → 1 atm, V → ??, n → $\frac{3}{28}$, R → 0.0821, T → (0 + 273) k

$$mol = \frac{3\ g}{28\ g/mol} = 0.107\ mol$$

1 mol → 22.4 L

0.107 → X = ?

$X = (22.4 * 0.107)$ L

A small bubble rise From the bottom of Lack to the suraface of water

* In the bottom

$$\begin{bmatrix} P = 6.4\ atm \\ T = 8^\circ C \\ V = 2.1\ mL \end{bmatrix}$$

n, R constant

* surFace

$$\begin{bmatrix} P = 1\ atm \\ T = 25^\circ C \\ V = ?? \end{bmatrix}$$

* خطأ تحويل السيلسيوس أي كلفن

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{6.4 * 2.1}{(8 + 273)\ k} = \frac{1 * V_2}{(25 + 27)}$$

$$V_2 = 14\ mL$$

* اذا طلب الجواب بدل L

* $\boxed{1L = 1000\ ml}$

NOTEBOOK

Subject Date No.

* The desity of gase = 7.71 g/L , The Temp = 36 °C
P = 2.88 atm , calculate the moleculer wieght ?
($Mt = g/mol$)

$PV = nRT \rightarrow PV = \frac{mass}{Mt} \cdot Rt$

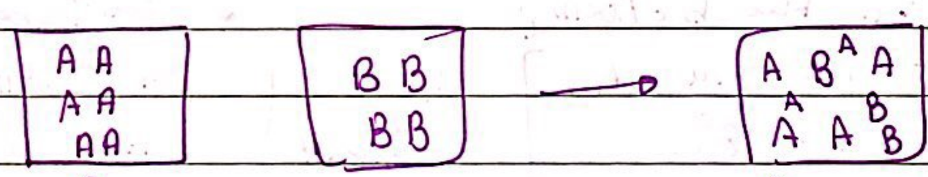
$$Mt = \frac{mass \; Rt}{V \, P}$$

d

$$= \frac{7.7 \, g/\cancel{L} \times 0.0821 \, \cancel{atm} \cdot \cancel{L} \cdot \cancel{K}^{-1} \, mol^{-1} \times (36+273) \cancel{K}}{2.88 \, \cancel{atm}}$$

$$= 67.9 \; g/mol$$

* Dalton's Law



P_A $P_t = P_A + P_B$

$P_t = 5$ barr

P_A ?
P_B

$P_A = X_A P_t \Rightarrow P_A = 0.6 \times 5$ barr $= 3$ barr

$P_B = X_B P_t \Rightarrow P_B = 0.4 \times 5$ barr $= 2$ barr

*** $X_A = \frac{mol \, A}{mol \, A + mol \, B} = \frac{6}{10} = 0.6$

$X_B = \frac{mol \, B}{mol \, A + mol \, B} = \frac{4}{10} = 0.4$

NOTEBOOK

Scanned with CamScanner

Subject Date No.

$2\,NaN_3 \xrightarrow{\Delta} 2\,Na_{(s)} + 3\,N_{2\,(g)}$, calculate the volume of N_2 generated by decompisition of 60 g of NaN_3 , $T = 80^\circ C$ $P = 8.23$ mmHg

$P V_{N_2} = n_{N_2} RT$

1// $mol\ NaN_3 = \dfrac{60\ g}{(23 + 3*14)\ g.mol} = 0.923\ mol$

2// $2\,mol\ NaN_3 \longrightarrow 3\,mol\ N_2$

$0.923 \longrightarrow x$

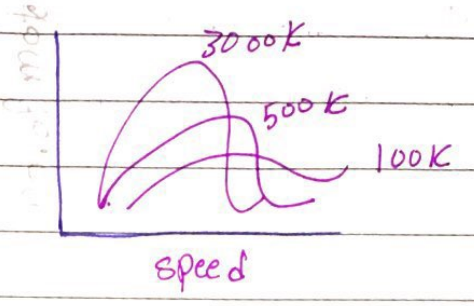
$x = 1.38\ mol$

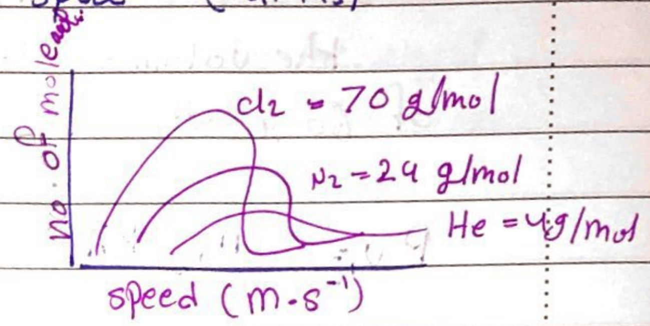
3// $P V_{N_2} = n_{N_2} Rt$

$V = \dfrac{1.38 * 0.0821 * (80 + 273)\,k}{(8.23 / 760)\ atm} = 36.9\ L$

نقسم عشان نطلع ﻫ د atm

Root-mean-squere speed (u_{rms})





$$* \; u_{rms} = \sqrt{\frac{3RT}{M_0}}$$

$m \cdot s^{-1}$; T → K ; M_0 → moleculer wight

$\boxed{1\,Kg = 1000\,g}$

R : 8.321 J / K.mol ($J \cdot K^{-1} mol^{-1}$)

$J = Kg \cdot m^2 s^{-2}$

Mt : Kg / mol

$$u = \sqrt{\frac{m^2}{s^2}} = \frac{m}{s}$$

* calculate the root-mean-squere speed for He gas at 25°C ??

$$u_{Rms} = \sqrt{\frac{3 * 8.321 (25 + 273)}{4 * 10^{-3} \; Kg \cdot mol^{-1}}} = 1.36 * 10^{3} \; m \cdot s^{-1}$$

Subject   Date   No.

* Diffusion (انتشار ,) :- a gradual mixing of molecules of one gas with another gas with virtue their kinetic energy.

$$\frac{r_1}{r_2} = \sqrt{\frac{m_2}{m_1}}$$

$$\boxed{r \propto \frac{1}{\sqrt{Mt}}}$$

r: rate of diffusion

Mt: Molar mass

* Effusion (تدفق)

effuse on gas from container to another through small barrier opening.

$$r \propto \frac{1}{\sqrt{Mt}} \propto \frac{1}{t} \Rightarrow \frac{r_1}{r_2} = \frac{t_2}{t_1} = \sqrt{\frac{M_2}{M_1}}$$

* Gas from carbon (c) and hydrogen (H) effuse throught the barrier in 1.5 minut while Bromings (Br_2) Effuse in 4.7 minute Find the gas??

$$\frac{t_1}{t_2} = \sqrt{\frac{M_1}{M_2}}$$

$M_1 = 16$ g/mol

$C_xH_y \rightarrow CH_4(g)$

$$\left(\frac{1.5}{4.7}\right)^2 = \left(\sqrt{\frac{M_1}{159.08\ g/mol^{-1}}}\right)^2$$

Subject Date No.

Homo

* The rate of O_2 diffusion to ↑ diatom unknown gas is 1.5, Find the unknown gas? ($Mt\,O_2 = 32$ g/mol)

$$\frac{r\,O_2}{r\,X_2} = \left(\sqrt{\frac{Mt\,X_2}{Mt\,O_2}}\right)^2 = (1.5)^2$$

$Mt\,X_2 = 72$ g/mol

* Atomic wight (X) $= \frac{72}{2} = 36$ g/mol

* Atomic wight w.cl $= 35.6 \approx 36$ g/mol

* collected gas over water surface

$KClO_4 \rightarrow KCl + O_2\,(g)$ $\frac{O_2}{\text{water}}$

$P_t = P_{O} + P_{\text{water vapor}}$

* oxygen gas gerated by decomposition of $KClO_4$, collected over water ($P_{\text{water vapor}} = 22.4$ mmHg)

$V = 128$ mol $T = 25\ ^\circ C$ $P_{\cancel{bottle}\ \text{total}} = 762$ mmHg

calculate the mass of O_2 in (g)

Subject Date No.

1) $P_{O_2} = 762 - 22.4 = 741$ mmHg

$PV = nRT \Rightarrow$ $PV = \frac{mass}{Mt} \cdot RT$

$Mass = \frac{PV \cdot Mt}{RT} = \frac{(741/760)\,atm \cdot 2 \times 10^{-1}\,L\,(2\ldots + 273)}{0.0821 \cdot 32\,g/mol}$

$= 0.164g$

N O T E B O O K

Scanned with CamScanner

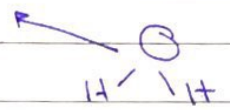
Subject Ch.11 ⇒ intermolecular Forces   Date الثلاثاء ٢٠٢٠-١٢/١٨   No.

* Intermoleculer Forces :-

attractive Forces between molecules $H_2O \dots H_2O$

* Intramoleculer Forces :-

Forces hold the atoms in the molecules.



- covalent
- Ionic
- metalic

	gas	Liquid	solid
* density →	V. Law	high	V. high
قابلية الانضغاط * compressibility →	V. high	slightly	incompressible
* Free of motion →	V. high	moderat	non restricted
* shape · volume →	assum the shape and volume of continer	fixed volum assume only the shape of container	fixed volume // shap

① dipol - dipol inter moleculer attractive

δH δP δH Pδ H Pδ

intra

(+ covalent bond -) (+ covelent bond -) (+ -)

$\delta+$ $\delta-$

H_3P ... H - P - H .... P - H
with H below each P and another H above the second P

Electronegativity ability to attract electron

EN↑

⊛ Hydrogen bond (N, F, O) ... H (dipol-dipol)

② Ion-dipol intermolecular attractive

$NaCl \xrightarrow{H_2O}$ H_2O ... Na^+ ..... O ($\delta-$) with H ... Cl^- and H ($\delta+$)

③ induced dipol (dispersion-London Forces)

غير قطبية

Cl_2, Br_2, O_2 (non-polar)

CCl_4, CH_4, C_6H_6

($\delta-$Br $\delta+$) ($\delta-$Br $\delta+$) ⊕ very short Live time

* polaraizability : distribution of electron's could distorted
(تشوه بالتوزيع الالكتروني) تشوه

3 a) Na^+ (δ^- Br δ^+)

Ion - induced dipol → induced negtive charge

Ion - dispersion London Forces.

3 b) dipol - induced dipol

$H^{\delta+} \; O^{\delta-}$ ... (δ^+ Br_2 δ^-)

H

* انواع القوى الموجودة ← H_2O

* H_2O ⇒ (1) dispersion - london الأضعف
(2) dipol - dipol
(3) H - bond الأقوى

* Mt ↑ induced dipol ↑ (طردي)

F
Cl
Br
I

size ↑

$F_2 < Cl_2 < Br_2 < I_2$

* properities of Liquid

(1) surFace tension :

The energy required to tens or increas the surface of liquid per unit area.

Subject　　　　　　　　　　　　Date　　　　　No.

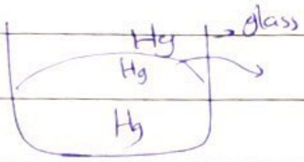
$H_2O > H_3P > ccl_4$　　　As intermolecular

H-bond　　dipol-dipol　　induced Forces $\uparrow$

dipol ST $\uparrow$

قوة التماسك

② Cohesion (cohesive) ; attractive Forces between Like molecules



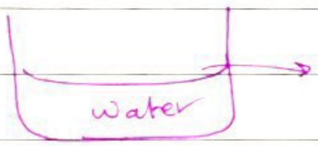
تحدب
Convex

Cohesion > adhesion

قوة التلاصق

* Adhesion ⇒ Atractive Forces between un-like molecules

تقعر



concave ⇒ Adhesion > cohesion

N O T E B O O K

Scanned with CamScanner

#الأحد ...

Subject Date ٢٠٢٠/١٢/٢٣ No.

③ Viscosity :- measure fluid's resistance to Flow.

. اللزوجة ←

* Inter molecular Forces α Viscosity

* Tempreture $\alpha \frac{1}{\text{viscosity}}$

* $NaCl_{(s)}$, $H_3PO_{4(l)}$ $\xrightarrow{H_2O}$ Ion - dipol → stronger
dipol - dipol (H - bond)

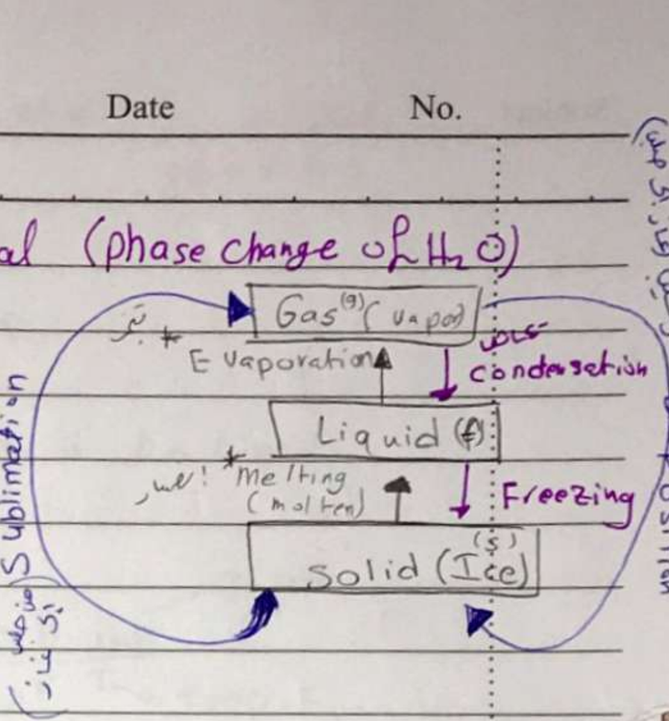
$H_2PH \cdots O$ (H_2O)

* Ion-dipol > H-bond > dipol-dipol > induced dipol (dispersion London Force)

* HF. HF ① , NH_3 ③ , H_2O ② $\xrightarrow{NOF}$ EN ↑

* C_6H_6 , CCl_4 → dispersion
CH_4 , Cl_2 , O_2 , Br_2 as Mt ↑ dispersion Force ↑

* phase change of material (phase change of H_2O)



(ΔH_{sub})

⇒ Molar heat of sublimation :-

The energy required to sublim one mole of solid to gas

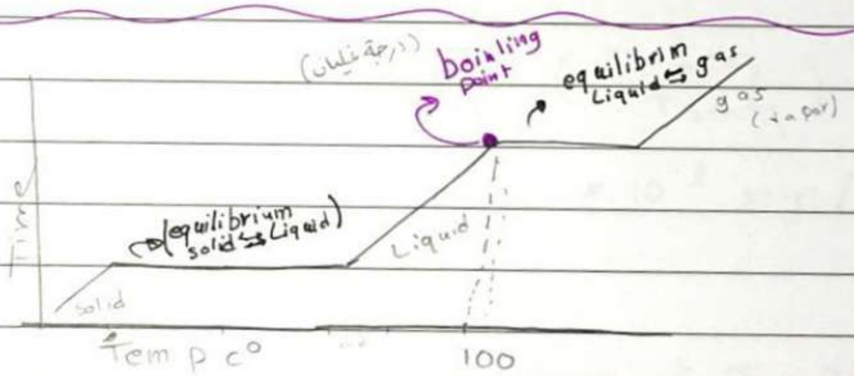
(ΔH_{vap})

⇒ Molar heat of vaporization :-

The energy required to vaporize one mole of Liquid to gas

*** Hess's Law ⇒ $\Delta H_{sub} = \Delta H_m + \Delta H_{vap}$

*** $\Delta H_{dep} = - \Delta H_{sub}$



⇒ boiling point :- (b.p) The temp at which the pressre over Liquid's surface equal the atmospheric pressure.

intermolecular Force ↑ b.p ↑

Subject Molar Heat of Vaporaization Date No.

$\Delta H_{sub} = \Delta H_{\text{Fusion or melting}} + \Delta H_{vap}$

Fusion : melting : change From soild to Liquid.

* Clausius law : $\ln P = \frac{-\Delta H_{vap}}{R\,T}$ → J.mol⁻¹ ; T → Temp. K ; R → 8.314 J.K⁻¹.mol⁻¹

At two values of pressure and Temp.

$$\ln\left(\frac{P_1}{P_2}\right) = \frac{\Delta H_{vap}}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$\ln\left(\frac{P_1}{P_2}\right) = \frac{\Delta H_{vap}}{R}\left(\frac{T_1 - T_2}{T_2 * T_1}\right)$$

ΔH - J/mol → $* 10^{-3}$ KJ/mol

* calculate ΔH_{vap} if solution at $T_1 = 35°c$ and $P_1 = 401$ mmHg, heated to $T_2 = 70°c$ and raise the pressure to 500 mmHg

$T_1 = 35 + 273 = 308$ K

$T_2 = 70 + 273 = 343$ K

$$\ln\frac{401/760}{500/760} = \frac{\Delta H_{vap}}{8.314\ J.K^{-1}.mol^{-1}}\left(\frac{308 - 343}{308 \times 343}\right)$$

N O T E B O O K

Subject Date No.

H_3PO_4, H_2SO_4, H_2S, HI, HBr, Hcl

dipol - dipol

HF > H_2O > NH_3 → H - bond (dipol-dipol)

Br_2, Cl_2, I_2, F_2

induced-dipol

I_2 > Br_2 > Cl_2 > F_2

N O T E B O O K

Scanned with CamScanner