Re Common Acid

↓

D | HCl, HBr, HI | strong acid
"C | HNO_3 — mono Protic
| H_2SO_4 → di protic

e.g. | HF | weak Base
| $HC_2H_3O_2$, CH_3COOH
| H_3PO_4 → Triprotic

Tri Protic → (3) H
mono Protic → (1) H
di protic → (2) H

Common Base

KOH $Mg(OH)_2$ — Strong Base
$NaOH$ $Ca(OH)_2$
$LiOH$ $Ba(OH_2)$

NH_3 → weak weak Base

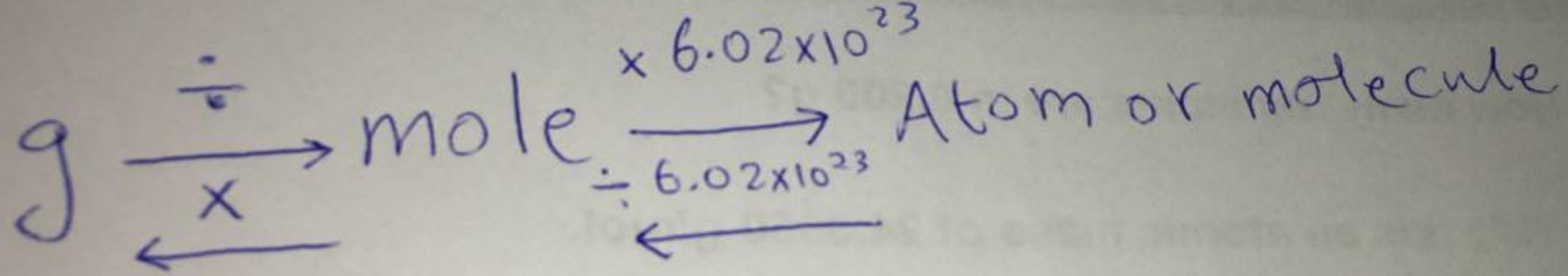
ectro
tion"
etal

Na

and Cl (nonmetal)

lectron "Oxidized"

1️⃣John Dalton : modren atomic theory & the law of multiple prop
2️⃣J.J Tomson : plum pudding & electron
3️⃣Rutherford : gold foil experiment & discover nucleus, protons
4️⃣Bohr : orbitals and quanty energy level
5️⃣Robert Millikan : oil drop experiment & mass and charge of electron
6️⃣Demetre Mandeleev : periodic law & first periodic table
7️⃣Mosely : modren table of atomic number
8️⃣James Chadwick : discovered neutrons
9️⃣Schwardinger : electron cloud model
🔟Binning and Rohrer : developed microscope to study atom
1️⃣1️⃣Antonie Lavoisir : law of conservation of mass
1️⃣2️⃣Jozeph Prust : the law of definite proportion


g
÷
×
mole
× 6.02×10²³
÷ 6.02×10²³
Atom or molecule

Phys / Chem

___*Chem*___ - rusting of iron

___*Phys*___ - crushing a can

___*Phys*___ - melting an ice cube

___*Chem*___ - combustion (burning) of wood

___*Chem*___ - metabolism of food in the body

___*Chem*___ - mixing an acid and a base

___*Chem*___ - cooking an egg

___*Phys*___ - boiling water

___*Phys*___ - mixing sand and water

___*Chem*___ - digesting sugar with the amylase in saliva

___*Chem*___ - mixing baking soda and vinegar to produce carbon dioxide gas

___*Chem*___ - baking a cake

___*Chem*___ - electroplating a metal

___*Phys*___ - breaking a glass

___*Phys*___ - dissolving sugar and water

___*Chem*___ - using a chemical battery

___*Chem*___ - burning wood

___*Phys*___ - dissolving salt in water

___*Chem*___ - mixing acid and base

___*Phys*___ - shredding paper

___*Phys*___ - chopping wood

___*Phys*___ - mixing red and green marbles

___*Phys*___ - sublimating dry ice

___*Chem*___ - digesting food

___*Phys*___ - crumpling a sheet of paper

___*Phys*___ - melting an ice cube

___*Phys*___ - casting silver in a mold

___*Phys*___ - breaking a bottle

0 → 0.4 non polar

0.5 → 2 polar

2 → more Ionic

Ch:4

① Stoichiometry

Stoichiometry : ما يطلب مني في حساب كتلة بالجرام
من معادلة موزونة

Example : $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

1 mole → 2.72 mol C_3H_8

عدد الجزيئات = mol × N_A

4 mole → [ ] H_2O

10.88 mole

* ممكن تطلب كتلة بالجرام

عدد المولات mole = كتلة g / كتلة مولية

② Limiting Reactant

أي تفاعل مولات المادة الاستهلاك

A | B

تناسب مع المادة المحددة

عدد المولات

theoretical yield = ناتج الصغرى هي كتلة العدد والمقدار

مصطلحات لازم نعرفها

- Percent yield
- Theoritecal yield
- Actual yield.

③ Solution.

homogenous mixture

$M = \frac{n\,(mol)}{V\,(L)}$

(n: Solute; V: Solution)

Solution = Solute + Solvent

n / M | L

small amount → Solute (مذاب)

Solvent (مذيب) → large amount

Solid + liquid → Suger in H_2O

gas + gas → Air

gas + liquid → Soda

Solid + Solid → Steel

Solution

$M_1 \cdot V_1 = M_2 \cdot V_2$

Dilution تخفيف

* Type of aqueous solutions.

$NaCl/H_2O$ — Same — $C_6H_{12}O_5/H_2O$

↓ Ionic Compund

homogenous dissolve in H_2O disappear

↓ molecular compund → Acid

Such as : Hcl

Na^+ Cl^-

Conduct ✓

Not Conductor ✗

↓ Non electrolyte

electrolyte → any substance dissolve in H_2O Conduct electricity

- Strong - Complet Ionization

Nacl

Hcl

HBr

HI

H_2SO_4

HNO_3

- weak - تأين جزئي

① HF

② CH_3COOH // $C_2H_3O_2$, Vinegar — Acetic

③ H_2CO_2

④ $\frac{1}{3}$

Acide / Base

③ H_3O^+ ← ماء + حمض R^+

OH^- ← ماء + قاعدة

* Arrhenius definition.
  - Acid → H^+
  - Base → OH^-

$AH^+ + H_2O \rightarrow H_3O^+ + A$

حمض + ماء ← الحوامض → hydronium ions

acide	Base
Sour taste طعم	bitter مر
React with metal ⟶	Not
Feel like H_2O ⟶	slipping {soap, Shampo}
blue → Red	Real → blue
HA →	← AOH

Common Acid

HCl, HBr, HI } strong acid

HNO_3 ← mono Protic

H_2SO_4 → di protic

HF, $HC_2H_3O_2$, CH_3COOH } weak Base

H_3PO_4 → Triprotic

Tri Protic → ③ H

mono Protic → ① H } دقة

di protic → ② H

Common Base

KOH	$Mg(OH)_2$	Strong Base
NaOH	$Ca(OH)_2$	
LiOH	$Ba(OH)_2$	

NH_3 → weak Base

4

5 Oxidation - Reduction Reaction

"Redox" Reaction.

← فاصلين ملازمين لبعض

Oxidation → loss e⁻ , بيزيد عدداتأكسد

Reduction → gain e⁻ , بيقلل عدداتأكسد

$4Fe + 3O_2 \rightarrow 2Fe_2O_3$ (oxid / Red)

علشان احسب :

العنصر لحالو = صفر

الايونات = بتحتفظ بالي حاملها

المركبات = صفر

Polyatomic = للعناصر بحسب شحنتها

- oxidition agent
- Reduc

$C + 2S \rightarrow CS_2$

0, 0 → +4, -2

- oxid
- Reduction agent

* اللي بيزيد لو اكسدة ← هو العامل المختزل

Reduction Agent ← oxidition

* اللي بيزيد لو اختزال ← عامل مؤكسد

oxidition Agent ← Reductio

كيف نحسب عنصر في مركب

K_2SO_4

المركب كله = zero

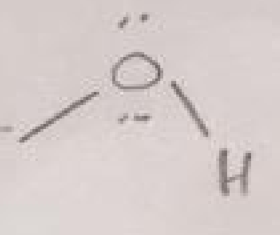
K_2SO_4: (+2) + □ − 8 = 0

S → +6

Lewis

H_2O - 8 valence e⁻ — 4 valence pair

2 lone pair / 2 bonding pair



Ionic compound:

- No individual molecules units, instead they have a 3D array of cations and anions.

Polyatomic ions: Several atoms attached toge by covalent bonds into one ion.

- compounds must have no total charge.

Carbonate CO_3^{2-}

bicarbonate HCO_3^-

Nitrate NO_3^-

Nitrite NO_2^-

Sulfate SO_4^{2-}

Sulfite SO_3^{2-}

ammonium NH_4^+

Phosphate PO_4^{3-}

Hydroxide OH^-

$H^+ + H_2O \rightarrow H_3O^+ + A$

Base → OH^-

hydronium ion

الخواص

taste

with metal

Base

bitter

CH:2

Trend

* Atomic Ridus

تزيد في الدو ↓

يقل من اليسار لليمين →

عكس

* Zeff

نفس Atomic radius

metalic charte

Non metalic charcte

زيد Zeff

الترتيب

* Inoziation Energy

Type: endo — 1st, 2nd

نفس Zeff — تقل ↓ — تزيد →

* Electron Affin...

endo.
exo

↓ نفس Zeff

weak Base

Chemistry CH:7

أول يوم بالمدرسة حددنا...

Single boand — 1σ ← ألكان (C–C)

double boand — 1σ, 1π ← ألكين (C=C)

تفاعل addition ←

triple boand — 1σ, 2π ← ألكاين (C≡C)

* التهجين والزاوية ← Table
* التسمية مهمة ← الموجودة في المذكرة.
* سيس + ترانس.

(C) (H) > تفرق بينهم في حسب ← أنواع الكحول

Primary — 2 H

Secondry — 1 H

Teritery — 0 H (Zero)

التفاعل زيل مناع H_2O

الفورمالين ↓ رائحة نفاذة

استر ← الفوائد

كحول ← إيثر 2

كحول + كربوكسيل ← استر

أكسدة الكحول ← Acid

→ function groupe

شكل كل واحد

التسمية في suffix

الستوح

CH: 5

نظريتين

Strong Acide & weak

كيف نقيس PH

Lewis

Acid

Al + □

B + □

Co2

Base

O
N
S
P

+ □

e.g : H^-

كلشي مشحونة ذا ايدا

اشوف

Def

CH 7

← الدهايد ← كربونة وهرا ← فورم الدهايد (C)

كربونين ← C-C ← استر الدهايد.

اختزال
كحول ← الدهايد → حمض كربوكسيل Acid

كيتون ← أيتون ← (C-C-C) ٣ كربون

الكحة تتبع كربوكسيل Acid
اختزال كحول

ريحة الفواكة وطعمها
حامضة
استر
كحول + كربوكسيل Acid

حامضة ← ملح الاستر أو ملح الحامض

* الأمين + كربوكسيل Acide ← Amide

* كل المواد العضوية ← كتروه ← O_2 ← $H_2O + CO_2$
as Rule

In considering the effect of a change in volume, we are assuming that the change in volume is carried out at constant temperature.

more pressure

(4)

$$A + 3B \rightleftharpoons 3C$$

3

forward [illegible]

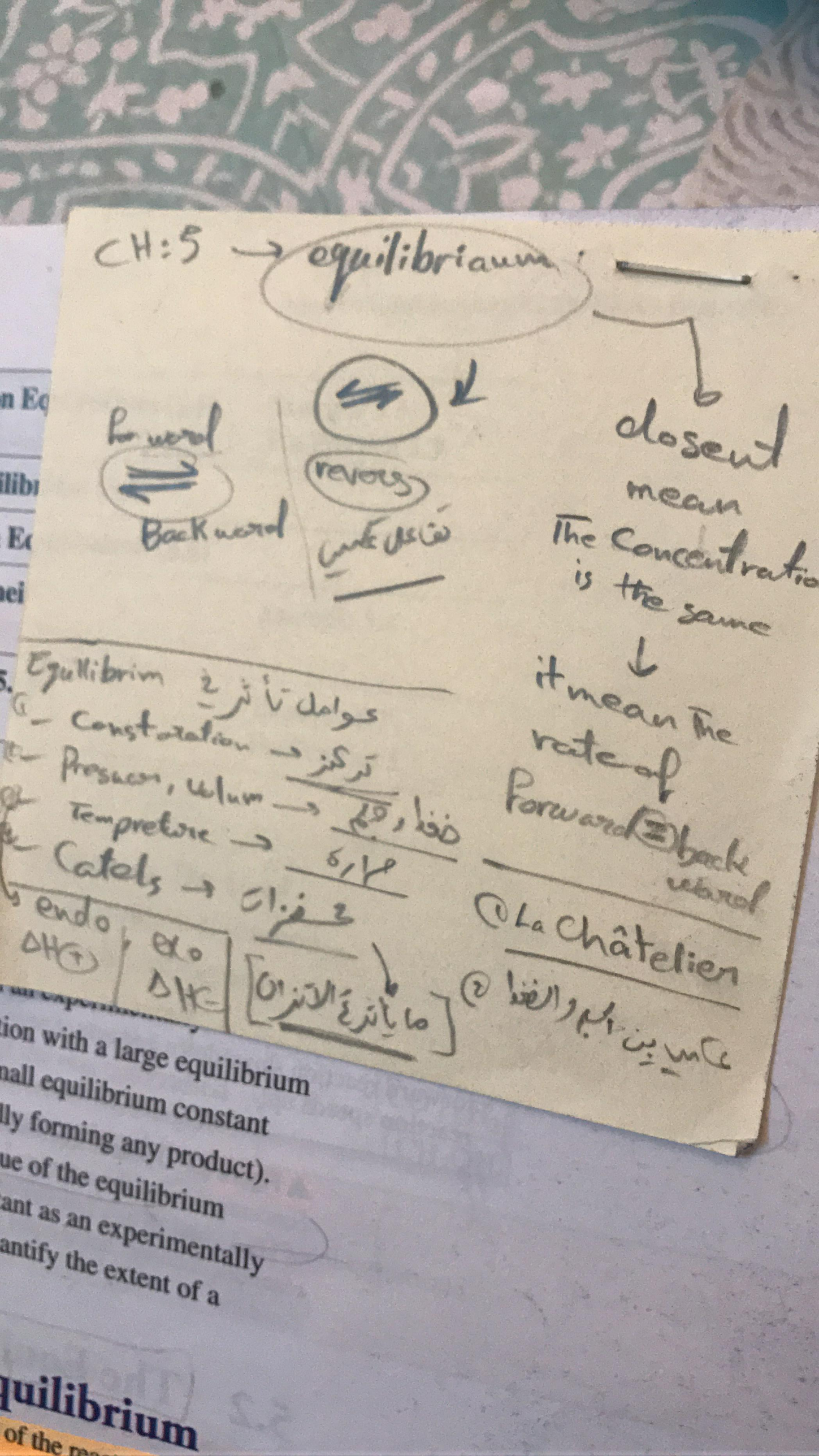
1 mol — 1 mol

if $NO_2 \rightleftharpoons N_2O_2$

Not effect of Pressure

incress volume [illegible]

decreas Pressure



ion with a large equilibrium
nall equilibrium constant
lly forming any product).
ue of the equilibrium
ant as an experimentally
antify the extent of a

quilibrium
of the

① Alkene + halogen ⟶ Alkane Addition reaction

② Alkyne + 2halogen ⟶ Alkane Addition reaction

③ Alcohol + Alcohol $\xrightarrow{\text{catalyst}}$ Ethers + H_2O Condensation reaction

④ Alcohol + (O) ⟶ Aldehyde + H_2O Oxidation reaction ~~Condensation reaction~~

⑤ Aldehyde + (O) ⟶ Carboxylic Acid Oxidation reaction

⑥ Aldehyde + (H) ⟶ Alcohol Reduction reaction

⑦ Carboxylic Acid + (H) ⟶ Aldehyde Reduction reaction

⑧ Alcohol + CO $\xrightarrow{\text{catalyst}}$ Carboxylic Acid Carbonylation
(carbon mon oxide)

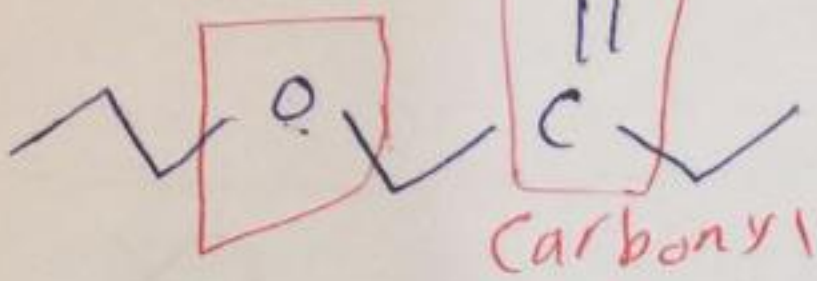
⑨ Carboxylic Acid + Alcohol ⟶ Esters + H_2O Condensation reaction

⑩ Ester + Base $\xrightarrow[H_2O]{\uparrow \text{heat}}$ Carboxylic acid anion (salt) + Alcohol (hydrolyed by base) Saponification

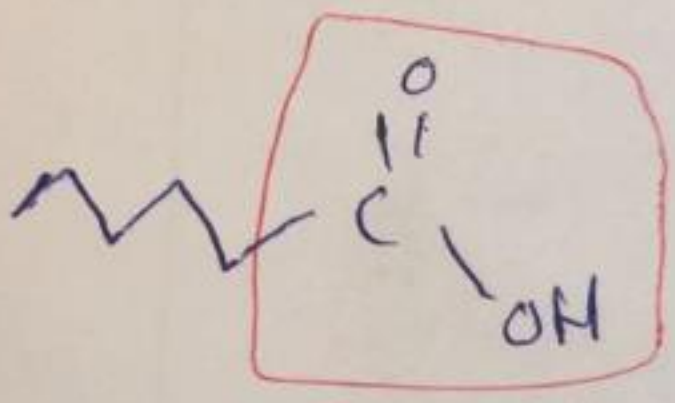
⑪ Ester + H_2O $\underset{}{\overset{H^+}{\rightleftharpoons}}$ Alcohol + Carboxylic acid Hydrolysis (by acides.)

⑫ Amine + Carboxylic acid ⟶ Amide + H_2O Condensation reaction.

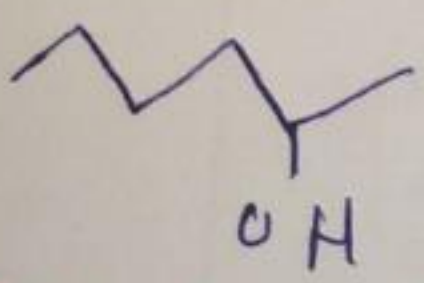
Ether



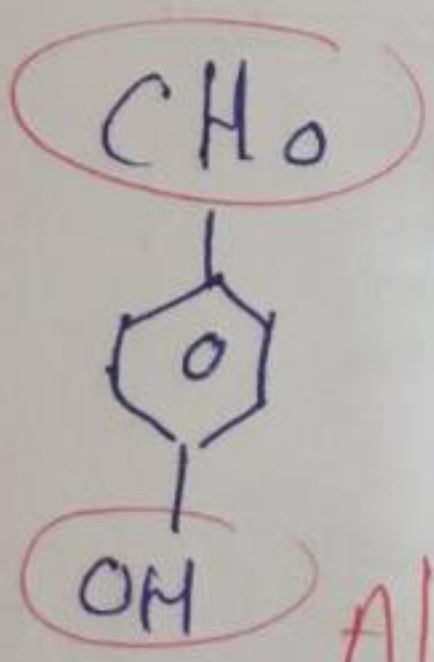
Carbonyl



Carboxlic



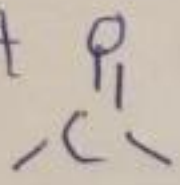
Secondar AlChol



Aldehyd

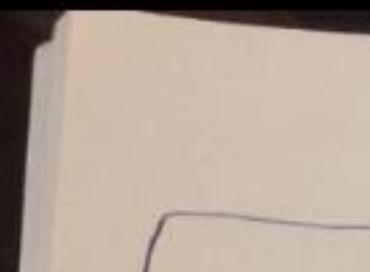
AlCho1

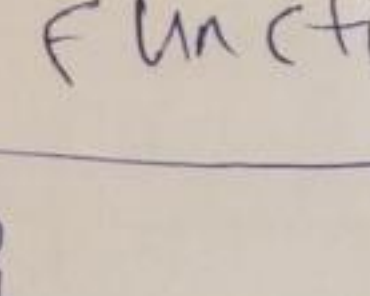
Functional group

without 

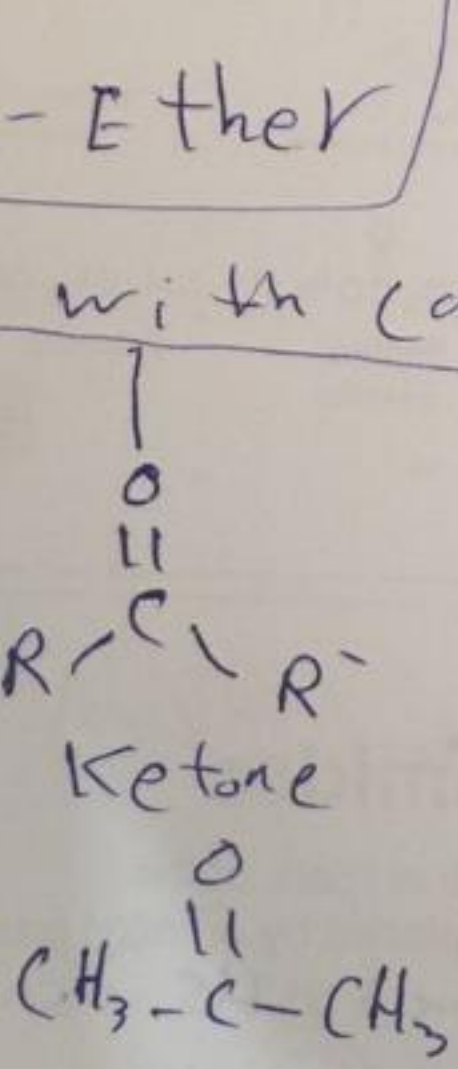
① R-OH Alchol
② R-NH_2 Amine
③ R-X (F, Cl, Br, I) Alkylhalides
~~④ R-O-R~~
⑤ R-O-R - Ether

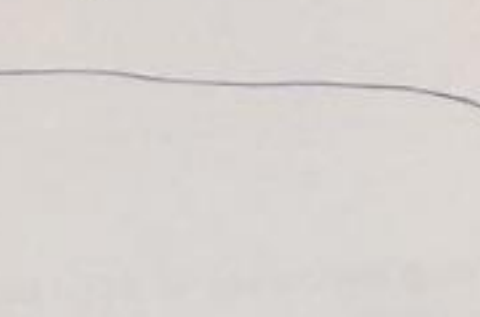
with carbonyl 



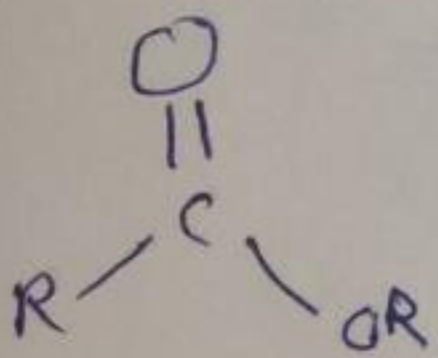


Ketone

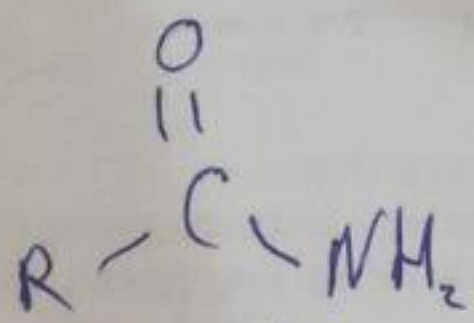




carboxlic
-COOH



Ester



Amide

nucleotides

- nitrogen base
  - adenine
  - guanine
  - cytosine
  - thaymine Dna only
  - Marcil Rna only
- sugar
  - Ribose RNA
  - Deoxyribose DNA
- Phosphate

Sugar ~~and~~ Nitrogenbase إذا اجا = ال

Nucleoside ← تسمى وقد

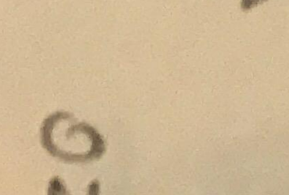
صابون

$CH_3\overset{O}{\overset{\|}{C}}O^-Na^+$ + كحول ← استر + قاعدة

NaOH

Saponification صابونة هيدروليز القاعدة

كربوكسيل أميد + أمين ← أميد



صابون

$CH_3\overset{O}{\overset{\|}{C}}O^-Na^+$ + گلیسرول ← استر + قاعدہ

NaOH

Saponification صابون سازی کا عمل

کاربوکسیلک ایسڈ + امین ← امائیڈ

$$R-NH_2 + R-\overset{O}{\overset{\|}{C}}-OH \leftarrow R-\overset{O}{\overset{\|}{C}}-NH_2$$

نزعها

كحول + كحول ← إيثر + (ماء)

أي عضوية + O_2 ← $CO_2 + H_2O$ ← أكسدة كاملة

- كحول + O ← ألدهيد أو كيتون ← أكسدة الكحول
- ألدهيد أو كيتون + O ← كربوكسيل ٢ حمض ← أكسدة
- اختزال الكربوكسيل ٢ حمض ← كيتون أو ألدهيد ← اختزال ← كحول

كربوكسيل Acid + كحول ← استر + (نزع الماء)

استر + ماء ← كحول + كربوكسيل Acid

الكربوهيدرات

monosaccharisde

C_3 - Triose

C_4 - Tetrose

C_5 - Pentose < Ribose / deoxyribose

C_6 - hexose — جلوكوز / فركتوز / جلاكتوز

Poly

Anim: جلايكوجين

Plant: نشا / سيليلوز

disaccharised

Sucrrose → فركتوز + جلوكوز   Table suger

Maltose → جلوكوز + جلوكوز   Malt suger

lactose → جلوكوز + جلاكتوز   Milk suger

کربوهیدرات : $C_nH_{2n}O_n$

Bubling Block : monosaccrid

glyactic linkage (الرابطه)

پروتین

Babling block امینو اسید

$NH_2 - \underset{R}{\overset{H}{C}} - COOH$

رابطه پپتیدی یا امید یونی
linkage

nucdic Acid

Bubling block : نوکلوتید

P — Sugar (Pentos: Rna Ribos, dex DNA) — nitrogen base (G, T, A, U, C)

Lipids

Ester linkage

Babling block

Faltyacid + جلیسرول

اول عضو
از کل
5 خانواده

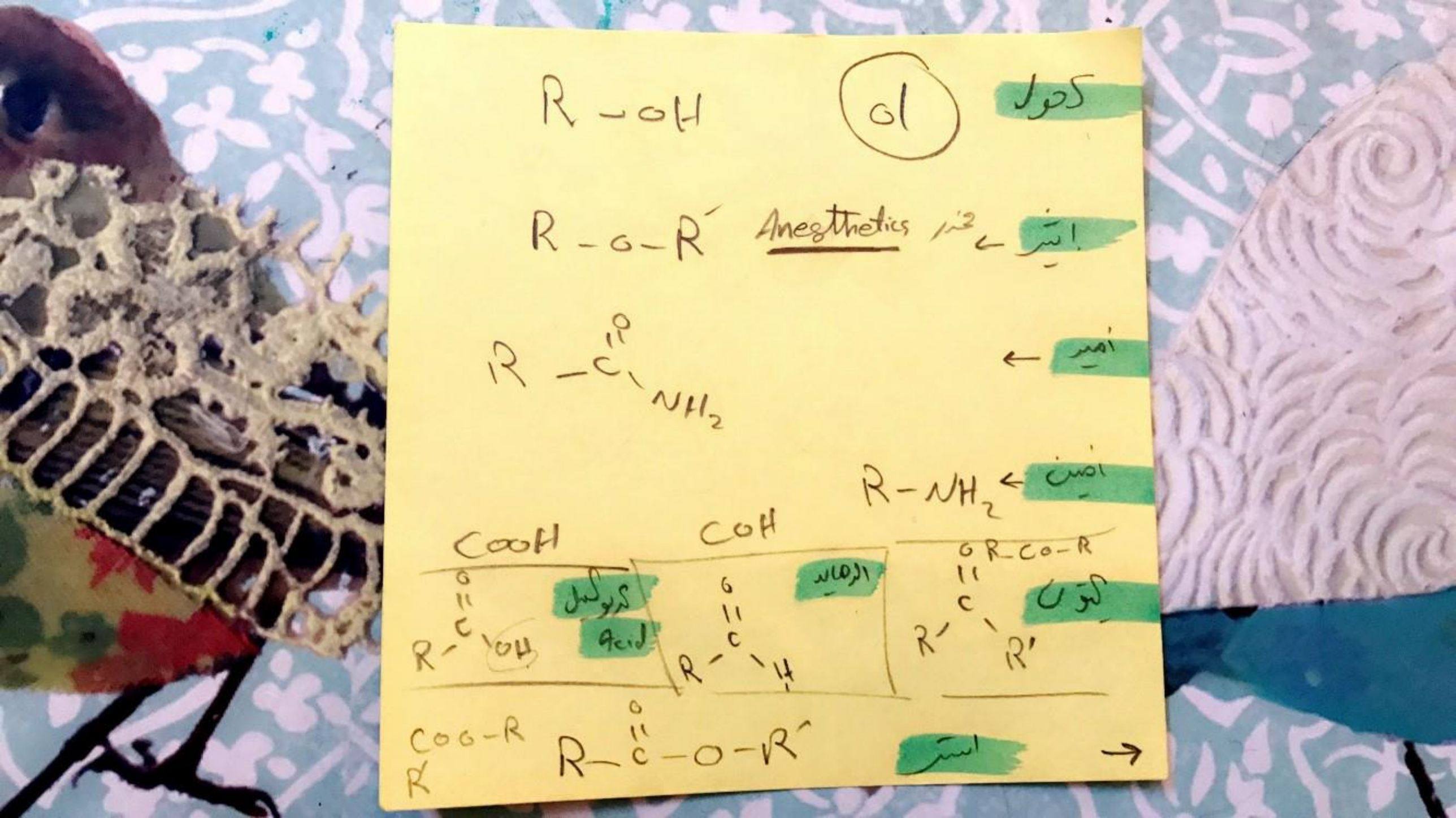
آلکان ← متان C_nH_{2n+2}

آلکین ← اتین C_nH_{2n}

آلکاین ← اتاین C_nH_{2n-2}

سایکلو آلکان ← پروپان C_nH_{2n}

آروماتیک ← بنزین C_6H_6 C_nH_n


R-OH
ol
كحول
R-O-R'
Anesthetics
إيثر
أميد
إمين
R-NH2
COOH
كربوكسيل
Acid
COH
ألدهايد
R-CO-R
كيتون
استر
COO-R'

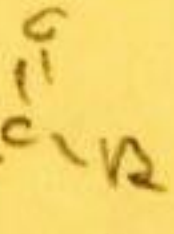
Suffixes

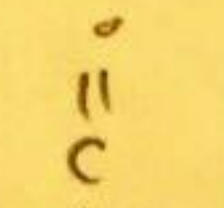
ane انکان

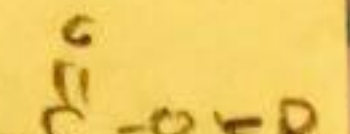
ene انکین

ayn انکاین

ol الکول R-OH

one کیتون 

al الدهاید 

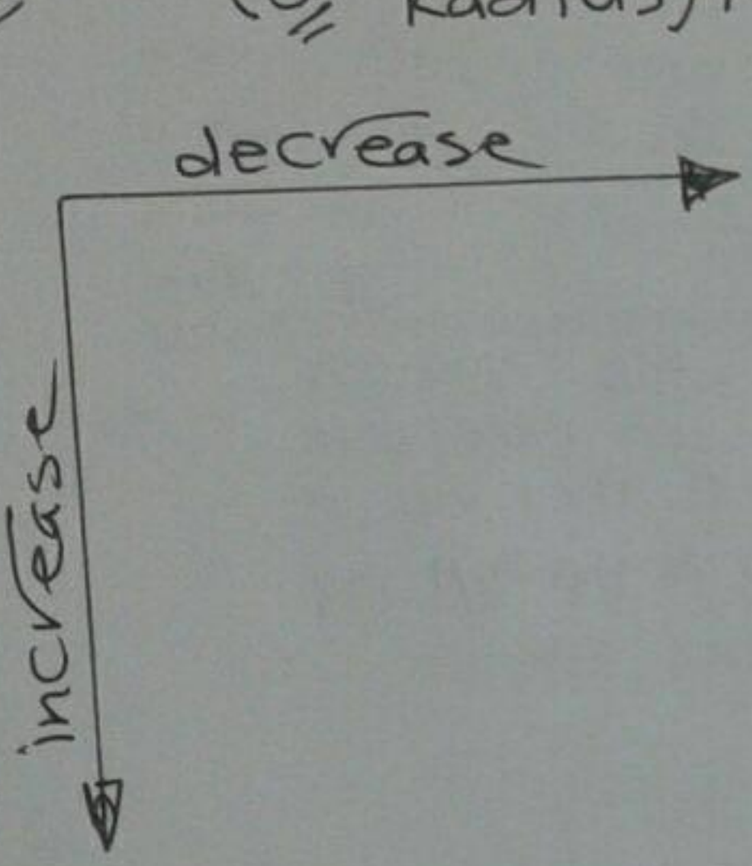
oate استر 

oic Acid کربوکسیلیک اسید

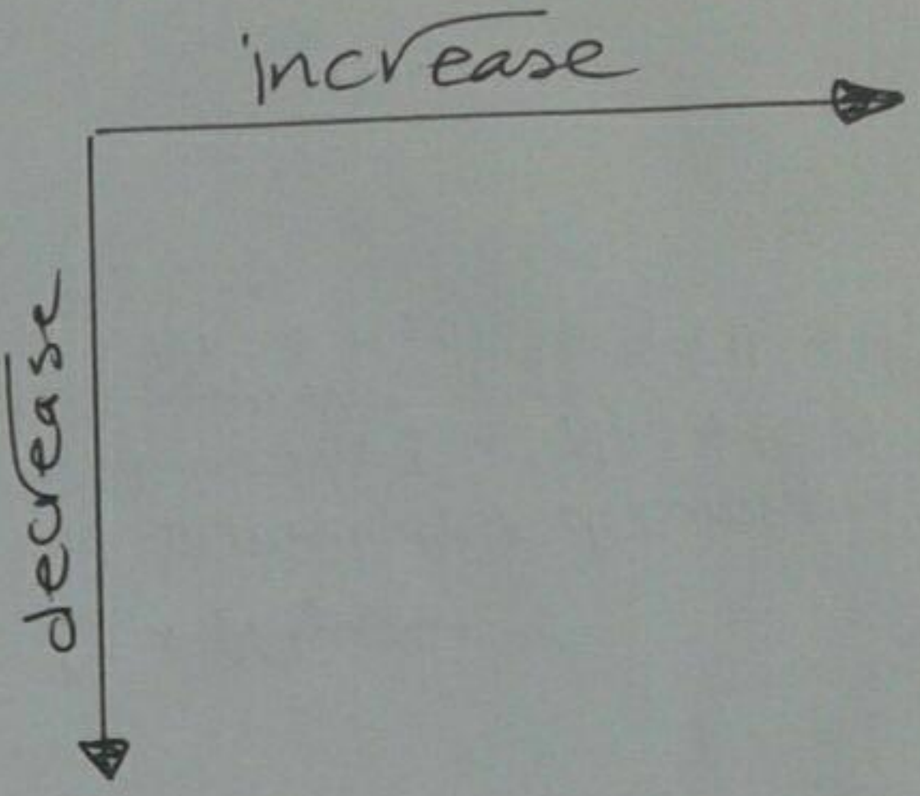
* Periodic Trends *

تأثير سلوك خواص عناصر الجدول الدوري

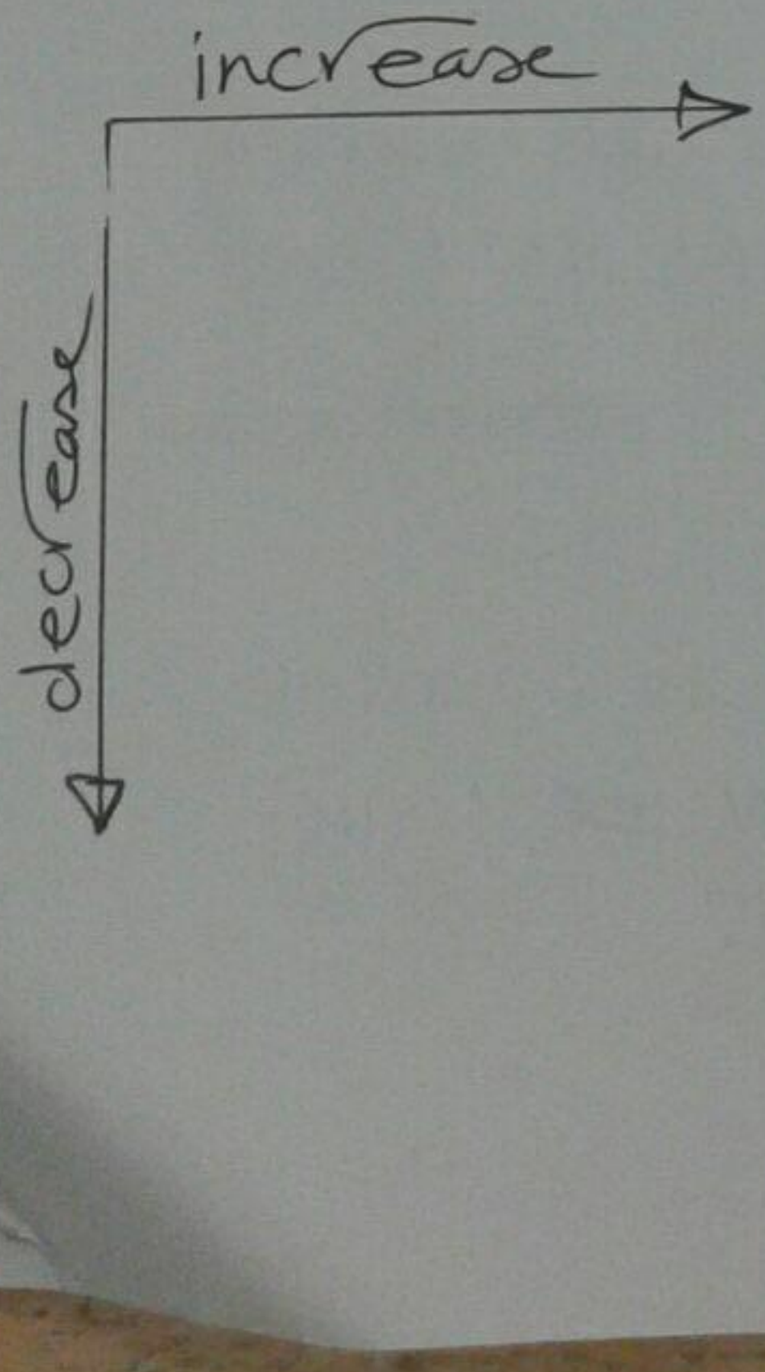
① Atomic size (or Radius) :-



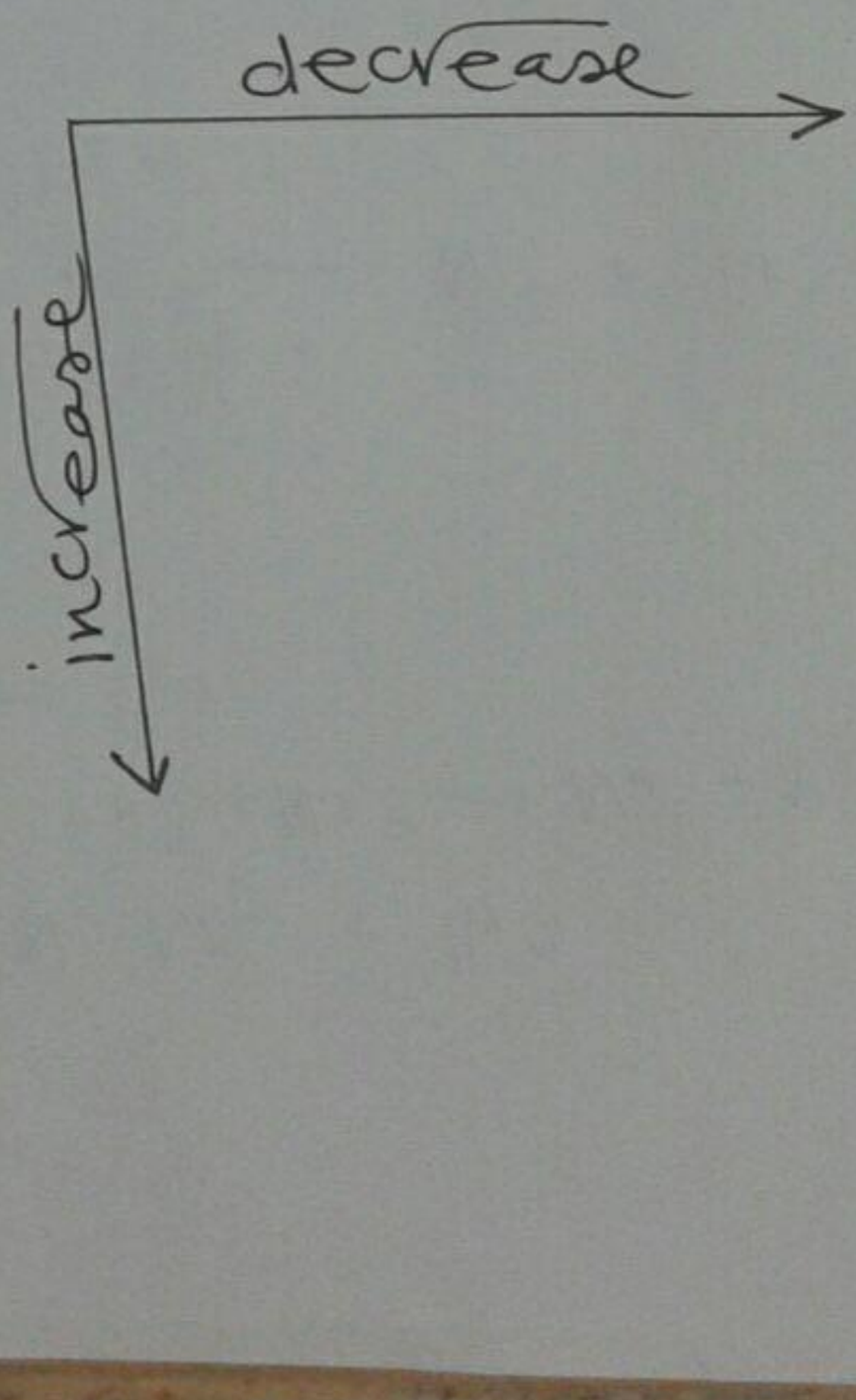
② Ionization energy (I.E.)



③ Electron affinity



④ Metallic Character :-



« Matter »

• Key words:-

× matter × pure substance × mixture

*homogeneous * heterogeneous × element × Compouned.

× difinite »» * constant * fixed * indifinite

* unfixed. ×shape. × Volume. ×state.

× Classification. × Physical properties. × Chemical Properties.

Matter

matter

volume /mass

① an apple ③ table

② person ④ air

⑤ water ⑥ computer

⑦ iron ⑧ icecream.

⑨ wood. ⑩ sand.

non- matter.

no Volume /no mass

① heat. ② light

③ temprature. ④ sound.

⑤ love. ⑥ time.

⑦ feeling. ⑧ music.

Q) all of the following an matter exept?

« State of matter »

	Solid	liquid	gas
e]	difinite /fixed	unclifinite/variable	unclifinite/unfixed.
..]	difinite /constant	fixed/ difinite/constant	unclifinite/unfixed.
	uncompresible	maybe compresible	Compresible

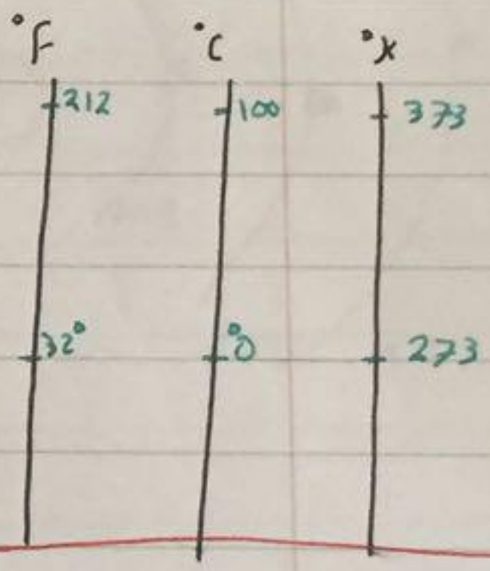
«Units»

	metric		Convert 50 lb to	SI
Lenghth	m	not M	kg [kg = 2.21 lb]	m
Volume	L		x = 50 lb	m^3
mass	g		$x = \frac{1 kg \times 50 lb}{2.21 lb} = 22.7 kg$	kg
Temp	°C			°K
Time	s			s

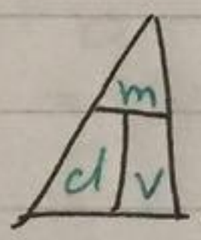
$$°F = 1.8 \times °C + 32 \qquad °C = \frac{°F - 32}{1.8}$$

$$°K = C + 273$$

Normal body tempretur = 37°



$$D = \frac{m(g)}{V(mL)}$$



$$1 mL = 1 \underbrace{cc}_{\text{cubic cm}} = 1 cm^3$$

Physical changes and Chemical changes

Physical changes	Chemical changes
x change in the state.	x change in the composition.
x easily reversible	x irreversible
x no new product	x new product formed.
x	x heat , light , sound, gases preap/taker يسب
1) Crushing a can.	1) Purning wood.
2) Melting an icecream.	2) Souring milk
3) Boiling water.	3) mixing acid and base.
4) mixing sand and water.	4) heating sugar ~~into Caramel~~.
5) Dissolving sugar in water,	5) Baking cake.
6) shreedding paper.	6) cooking eggs.
7) chopping wood.	
8) mixing red and green pigment	

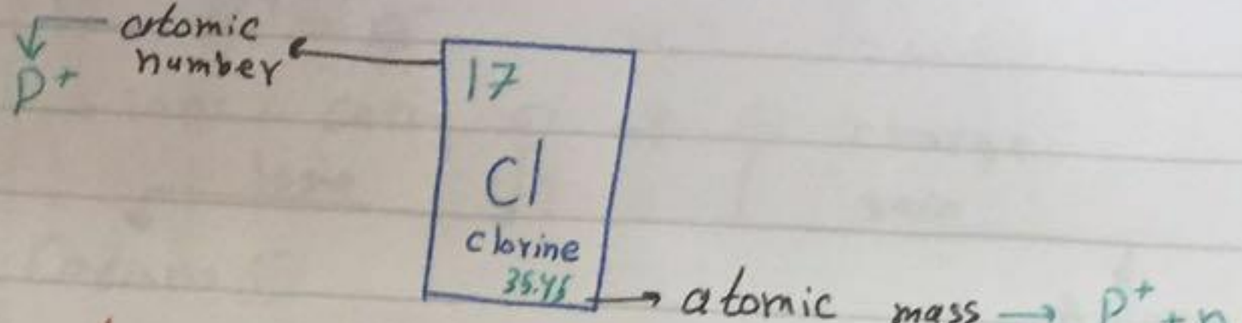
Physical Properties

- x Color
- x odor
- x taste
- x density
- x Vicosity
- x Melting point
- x Boiling point

Chemical Properties

- x flammability
- x Reactivity
  - React with air
  - React with acid.
- x Corrosive
- x toxicity

• Periodic table :-



• atoms → $p^+ = e^-$

• Mendleev :-

× according to mass number.

• Mosely :- → modern periodic table.

× according to atomic number.

• Periodic table has :-

× 94 metals
↳ left / middle.

× 17 nonmetals
↳ upper right.

× 7 metalloid
↳ in between.

• In Periodic table :-

↳ Vertical coloums = family or group.
↳ have similar phisycal and chemical properities.

horizental rows = period.

• I A = Alkali metal.
• II A = Alkline earth metals.
• III A = Ga Ge
• VII A = Halogens.
• VIII A = Nobel gases.
• Transitional metals = Fe

Metals 94 :	Metalloids 7 :	Non-metals 17 :
• good conductors for heat and electricity • shiny. • solid / except : mercury. • Malleability. • ductility • lose electrons (+)	• semi conductors.	• Poor conductor for heat, electricity • not shiny. • s / l / g • No Malleability • No ductility • gains electrons → anions (−)

Atoms ⟶ neutral.
↳ $P^+ = e^-$
↳ ions : carry ⊕ or ⊖ charge.
lose ↓ ⊕ Cations ⊕
gain ↓ ⊖ Anions ⊖

• Group 1A, 2A, 3A
lose $1e^-$ ← lose $2e^-$ ← lose $3e^-$
1^+ ← 2^+ ← 3^+

• Group 5A, 6A, 7A
gains $3e^-$ ← gain $2e^-$ ← gain $1e^-$
3^- ← 2^- ← 1^-

• فرق بين عدد التكافؤ وعدد الشحنة [مهم]

• molar mass = atomic mass

$^{6}C^{12}$ 12 g C = 1 mol C = 6.02×10^{23}

$^{13}Al^{27}$ 27 g Al = 1 mol Al = 6.02×10^{23}

$^{19}K^{39}$ 39 g K = 1 mol K = 6.02×10^{23}

---

ex} 6.5 g Cu

How many atoms?

g Cu $\xrightarrow[\text{molar mass}]{\frac{1\text{ mol Cu}}{}}$ mol Cu $\xrightarrow[1\text{ mol}]{\frac{6.02\times10^{23}}{}}$ Cu atoms.

$6.5 \times \frac{1}{63.5}$

$= 0.10$ mol Cu

0.10 mol Cu $\times 6.02 \times 10^{23}$

$= 6.16 \times 10^{22}$ atoms.

Types of chemical formula :-

- **Empirical**: relative number of atoms
  - CH_2O ← اصغر وحده بنائيه له ← $C_6H_{12}O_6$
  - 1 : 2 : 1
  - CH_4O_2 ← اصغر وحده بنائيه له ← $C_3H_{12}O_6$
- **Molecular**: actual number of atoms
- **structure**: attachment of atoms

Atomic level view of atoms

Pure substance

- **elements**
  - **atoms**: Na, He
  - **molecular**: ∴ diatomic elements
    - H_2 , O_2 , N_2
    - F_2 , Cl_2 , Br_2 , I_2
- **Compounds**
  - **molecular**: H_2O, NH_3, ~~[illegible]~~, $C_6H_{12}O_6$
  - **Ionic**: LiCl, KOH, NaCl

∴ Classify the following :-

1. Ba : atomic element
2. $FeCl_3$: Ionic compound
3. Br_2 : molecular element
4. Co : tomic element
5. NO : molecular compound

Chapter 2

1) Jon Dalton :- Modern atomic theory.

2) J. J Thomson :-
plum pudding, discover e^-

3) Ratherford :-
Gold foil experment.
Nucleaus and the p^+

4) Millikan :-
Charge of é and the mass.
~~oil~~ oil drop experment.

5) Bohr :-
Orbitals.

6) Chadwich :-
discover newtrons.

- Subatomic particles :-

× Protons ⊕ → 1 amu

× neutron ⊙ → 1 amu

× electrons ⊖ → negligable.

- النواة موجبة الشحنة.

Chapter - 3

Chemical Bonds

Ionic

Metals + Nonmetals

- transfer of e^- from metal to nonmetal
- metal —lose→ cation$^+$

-1A ⟶ +1
-2A ⟶ +2
-3A ⟶ +3

- nonmetal —gain→ anion$^-$

-5A ⟶ -3
-6A ⟶ -2
-7A ⟶ -1

ex: Na + Cl

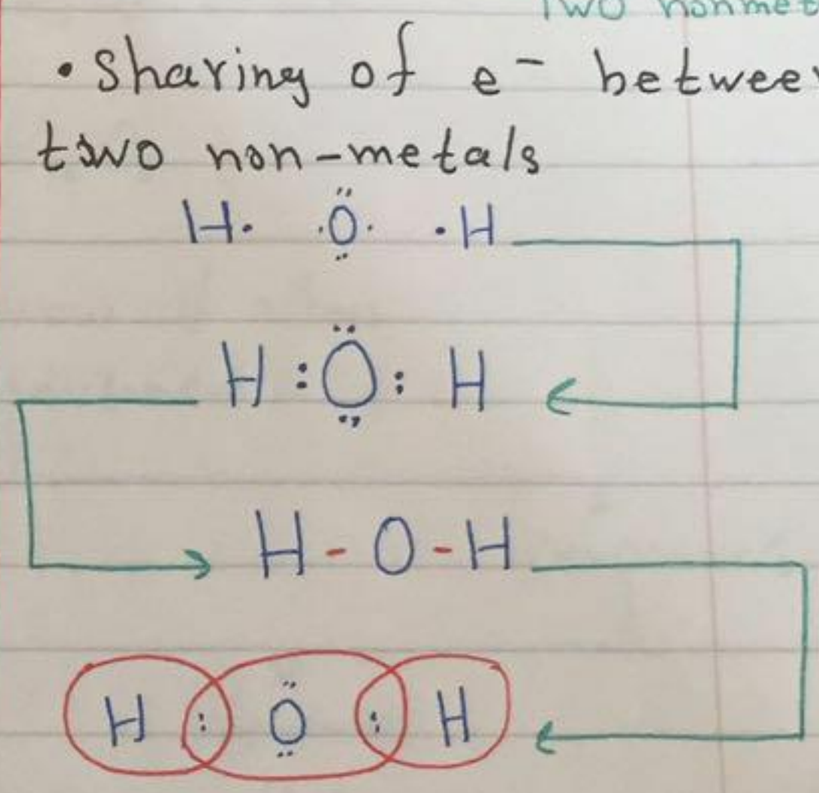
↳ Na^+ | ↳ Cl^-

∴ NaCl

Covalent

Two nonmetals

- Sharing of e^- between two non-metals



• Mass % composition:

- Calculate the mass % of O in $C_6H_{12}O_6$

$$\text{mass \%} = \frac{\text{part}}{\text{whole}} \times 100$$

$$= \frac{96}{180} \times 100 = 53.3\%$$

• Asprin :-

× C ≠ 60%. × H = 4.48% × O = 35.52%

- Calculate the emp. :-

• $60\,g\ C \times \frac{1\ mole\ C}{12\,g\ C} = 5\ mole\ C \div 2.2 = 2.25$

• $4.48\,g\ H \times \frac{1\ mole\ H}{1\,g\ H} = 4.48\ mole\ H \div 2.2 = 2$

• $35.52\,g\ O \times \frac{1\ mole\ O}{16\,g\ O} = 2.2\ mole\ O \div 2.2 = 1$

$$C_{2.25}H_2O_1 \times 4 = C_9H_8O_4$$

• The emp. formula of glucose is CH_2O and the molar mass 180 g/mol. Find the molecular formula?

• Mef. formula = emp. formula × n

• $n = \frac{\text{molar mass of compound}}{\text{emp. formula mass}}$

- $n = \frac{180}{30} = 6$

emp. f. × n = $CH_2O \times 6$

$= C_6H_{12}O_6$

• لتأكد من النتائج نحسب الكتلة المولية الجديد و ستظهر نفس احد معطيات السؤال.

Q) which of the following is a charactestic of both ~~solid~~ liquids and gases ?

a- difinite shape
b- difinite volume
c- indifinet shape
d- no correct answer.

((Classification of Matter))

according to the composition.

- Can be physically separateed [variable substance] → Yes → mixture
  - uniformity
    - NO → Heterogeneous
      - Sugan ~~in~~ tea. Salt / H_2O.
    - Yes → Homogeneous
      - soup أي كلمة Vegetable soup Checken soup.
- NO → pure substance
  - Can be chemicaly separateed
    - NO → element. , Au , Ag
    - Yes → compound. H_2O , NH_3

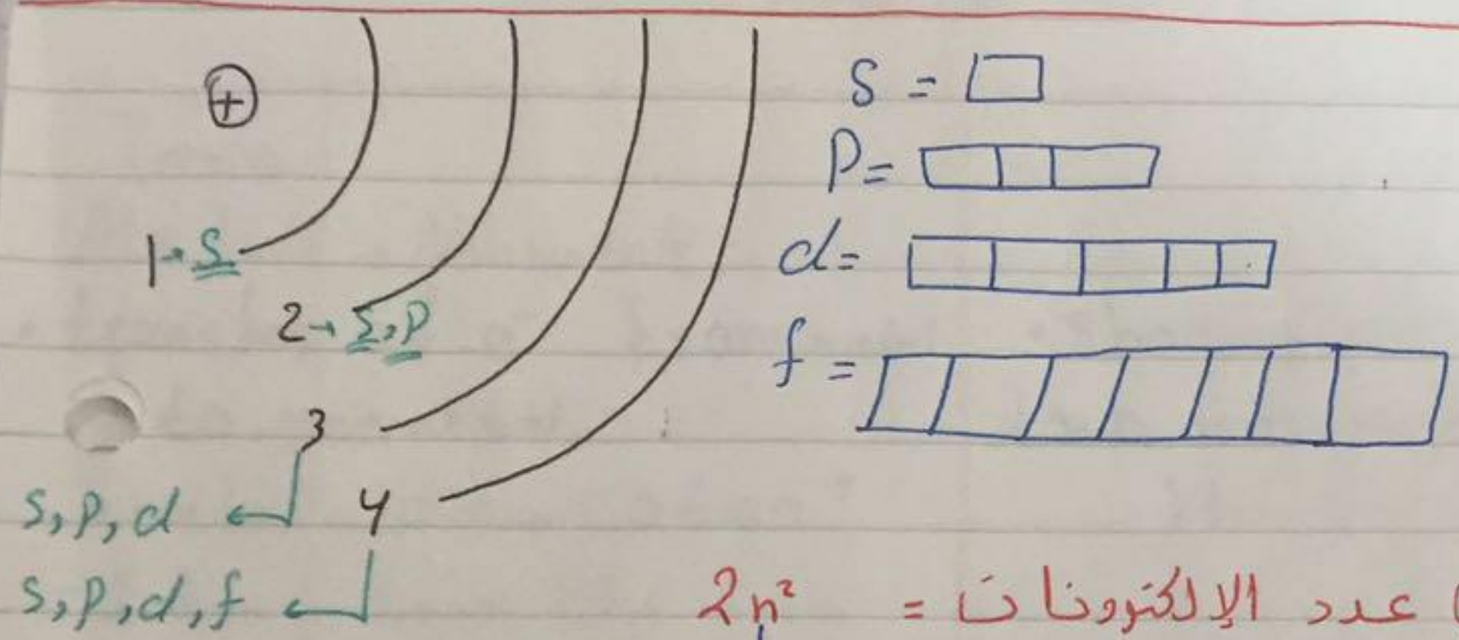
Q) classify each of the following species into elemetnt, Compound, homogeneous, heterogeneous mixture?

a) CO_2 compound
b) CH_4 compound.
c) H_2O compound.
d) Sand in H_2O Hetero
e) gasoline in H_2O Hetero
f) sugar in tea. Homo
g) vegetable soup. Hetero
h) silver (Ag) element
i) Ammonia (NH_3) compound.
j) Co element

إذا كان الحرفين كبار يكونا مركبا
وإذا كان واحد صغير وواحد كبير
يصبح عنصر

• 6 mol ⟶ g

$6\ \cancel{mol} \times \frac{12\ g}{1\ \cancel{mol}} = 72\ g$

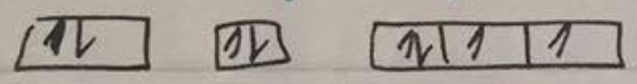


• لحساب عدد الإلكترونات = $2n^2$

↳ energy level :

① Aufubu :- start with lower energy level.

② Hunel's rule :- filling singular بعدين زوجي

$^{8}O^{16}$ 

③ Pauli :- maximum capacity is $2e^-$

1S 2S 2P 3S 3P

• انتبه ربما يكون هذا التوزيع هو توزيع أيون أو ذره متعادله.

• إذا كان أيون موجب اطرح من عدده الذري مقدار الشحنه

• إذا كان ايون سالب اجمع مع عدده الذري مقدار الشحنه.

Chapter - 3

Chemical Bonds

Ionic

Metals + Nonmetals

- transfer of e^- from metal to nonmetal
  - metal lose → cation$^+$
    - 1A → +1
    - 2A → +2
    - 3A → +3
  - nonmetal gain → anion$^-$
    - 5A → -3
    - 6A → -2
    - 7A → -1

ex: Na + Cl

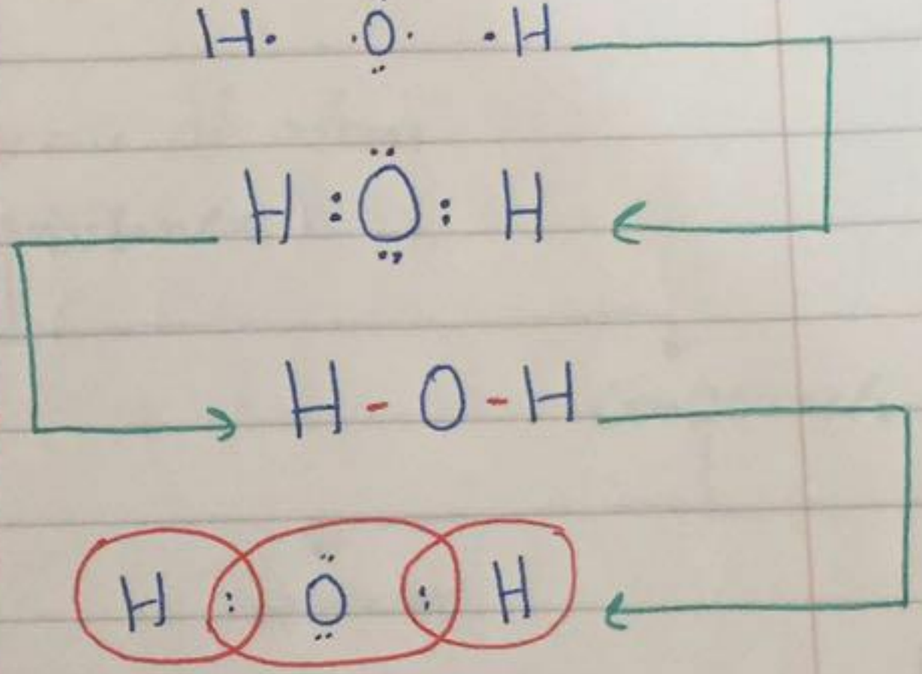
→ Na^+ | → Cl^-

∴ NaCl

Covalent

Two nonmetals

- Sharing of e^- between two non-metals



Save :- Fe :- +3, +2 (Ferric / Ferrous) Cu :- +1, +2 (Cuprous / Cupric)

ex: Fe_2O_3

Iron (III) oxide

ex: $Fe(OH)_3$

Iron (III) hydroxide

ex: FeO

Iron (II) oxide

ex: FeF

Iron floride

ex: $FeCl_2$

Iron (II) chloride

ex: CuF_2

Cupper (II) floride

ex: CuO

Cupper (II) oxide

ex: CuF

Cupper floride

X molecular Compound :-

Non-metal + non-metal + ide

prefex prefex

• mono لا تكتب في الاول ابدًا ∴

• CO :-

Carbon monoxide

• P_4S_{10} :-

tetrphosphoros decasulfide

• N_2O_5 :-

Dinitrogen pentaoxide.

• Br_3I_7

~~triiodine hepta~~

tribromine heptaiodide.

Save :- Fe :- +3, +2
- Ferric
- Ferrous

Cu :- +1, +2
- Cuprous
- Cupric

ex: Fe_2O_3

Iron (III) oxide

ex: $Fe(COH)_3$

Iron (III) hydroxide

ex: FeO

Iron (II) oxide

ex: FeF

Iron floride

ex: $FeCl_2$

Iron (II) chloride

ex: CuF_2

Cupper (II) floride

ex: CuO

Cupper (II) oxide

ex: CuF

Cupper floride

X molecular Compound :-

Non-metal + non-metal + ide
- prefex
- prefex

- CO :-

Carbon monoxide

- P_4S_{10} :-

tetrphosphoros decasulfide

- لا تكتب mono في الاول ابداً :.

- N_2O_5 :-

Dinitrogen pentaoxide.

- Br_3I_7

~~triiodine hepta~~

tribromine heptaiodide.

∴ Write the following compound:

① Na S

Na^{+1} S^{-2}

Na_2S

$+2 - 2 = 0$

② Mg O

Mg^{+2} O^{-2}

MgO

③ Al O

Al^{+3} O^{-2}

Al_2O_3

- CO_3^{-2} :- Carbonate
- HCO_3^{-1} :- bicarbonate
- SO_4^{-2} :- Sulphate (sulfate)
- NH_4^{+} :- Ammonium (positive)
- NO_3^{-} :- Nitrate
- NO_2^{-} :- Nitrite
- SO_3^{-2} :- sulfite
- OH^{-} :- hydroxide.

ex:

Na^{+1} SO_4^{-2}

Na_2SO_4

Ca^{+2} OH^{-}

$Ca(OH)_2$

∴ Naming of compound:

x Ionic compound:-

Metal + nonmetal

NaCl

Sodium chloride

O: oxide

S: sulfide

N: nitrite

H: hydride

- polyatomic لا تتغير اسمها بالمره

Na_2CO_3

Sodium Carbonate

$(NH_4)_2SO_4$

Ammonium sulfate

∴ Solutions ∴

5% glucose

5 g glucose → solute

H_2O → solvent

0.9% Normal saline

- Molarity (M) = $\frac{\text{no. of solute (mol)}}{\text{Volum of solution (L)}}$

$M = \frac{n}{V}$

- Find the Molarity of solution of NaOH 30mole in 1.5 L ?

$M = \frac{n}{V} \longrightarrow \frac{30}{1.5} = 20 \text{ mol/L}$

- if dissolve 80g NaOH in 250 mL H_2O ?

- $80\text{ g NaOH} \times \frac{1\text{ mol}}{40\text{ g}} = 2\text{ mol NaOH}$

- $M = \frac{2}{0.250} = 8\text{ mol/L}$

Chapter-4

- $2C_8H_{18} + 25O_2 \longrightarrow 16CO_2 + 18H_2O$

* $2C_8H_{18} : 16CO_2$

- 12 mole $C_8H_{18} \longrightarrow ?\ CO_2$

$= \frac{12 \times 16}{2} = 96$ mol CO_2

- 30 g $C_8H_{18} \longrightarrow ?$ g CO_2

① $30\text{g } C_8H_{18} \times \frac{1\text{ mol}}{114\text{ g}} = 0.26$ mol C_8H_{18}

② $= 0.26 \times \frac{16\text{ mol}}{2\text{ mol}} = 2.08$ mol CO_2

③ $= 2.08 \times \frac{44\text{ g}}{1\text{ mol}} = 91.5$ g CO_2

- $6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$

- How many g of glocuse can be produceed from 37.8g of CO_2 in photosynthesis ?

$6CO_2 \longrightarrow 1\ C_6H_{12}O_6$

① $37.8\text{g} \times \frac{1\text{mol}}{44\text{g}} = 0.85$ mol CO_2

② $0.85\text{ mol} \times \frac{1\ C_6H_{12}O_6}{6\ CO_2} = 0.14$ mol $C_6H_{12}O_6$

③ $0.14\text{ mol} \times \frac{180\text{ g}}{1\text{ mol}} = 25.2$ g $C_6H_{12}O_6$

- $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

- suppose you have 5 mol CH_4 and 8 mol O_2. What is the limiting reactant?

- 5 mole $CH_4 \longrightarrow 5CO_2$
- 8 mole $O_2 \longrightarrow 4CO_2$

O_2 is the limiting reactant

- $2NO + 5H_2 \longrightarrow 2NH_3 + 2H_2O$

- starting with 86.3 g NO and 25.6 g H_2. Find the limiting reactant, theoretical yield of NH_3 in g?

- $86.3\ g\ NO \times \frac{1\ mol}{30} = 2.87\ mol\ NO$
  ↳ limiting reactant.

- $2.87\ mol\ NO \times \frac{2\ NH_3}{2\ NO} = \boxed{2.87\ mol\ NH_3}$
  ↳ Limiting reactant.

- $25.6\ g \times \frac{1\ mol}{2\ g} = 12.8\ mol\ H_2$

- $12.8\ mol \times \frac{2\ NH_3}{5\ H_2} = \boxed{5.12\ mol\ NH_3}$

- $2.87\ mol\ NH_3 \times \frac{17\ g}{1\ mol} = \boxed{49\ g\ NH_3}$
  ↳ theoretical yield.

- if the actual yied of this reactant is 25 g, theoretical yield is 50 g. What is % yield?

$$\%\ yield = \frac{actual}{theoretical} \times 100$$

$$= \frac{25}{50} \times 100 = 50\%$$

• Balance of chemical equation :-

• $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

↳ coefficent

• Δ = heat • hv = light • shock = mechanical

• elec = electricity • g = gas • s = solid

• ℓ = liquid • aq = aqueas

• $C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$

× coefficent : 1, 5, 3, 4

• $4Al + 3O_2 \longrightarrow 2Al_2O_3$

:: Redox reaction :-

Oxidation - reduction :: Redox.

- Oxidation: lose of e^-, increasing of oxid. no.
- reduction: gain of e^-, decreasing of oxid. no.

• $4Fe + 3O_2 \longrightarrow 2FeO_3$

Fe → oxidation; O_2 → reduction.

• $2\overset{0}{H_2} + \overset{0}{O_2} \longrightarrow 2\overset{+1}{H_2}\overset{-2}{O}$

Under the product the writer marks $+2$ for H_2 and -2 for O.

H_2 (0 → +2): oxid. reducing agent.

O_2 (0 → −2): red. oxidizing agent.

Oxidation state :-

1) $\overset{+2}{H_2}S\overset{-8}{O_4}$ → S: $+6$

2) $\overset{+2}{H_2}\overset{-2}{S}$

3) $\overset{+2}{K_2}S\overset{-8}{O_4}$ → S: $+6$

1) $\overset{+3}{NH_3}$ → N: -3

2) NH_4^+ → N: -3, H: $+4$

NO_3^{-1} → N: $+5$, O: -6

- Bronsted- lowry:-
  - Acids :- donate H^+
  - Base:- accept H^+

* $NH_3 + H_2O \longrightarrow NH_4^+ + OH^-$
  - NH_3: base. H_2O: acid.

* $H_2SO_4 + H_2O \longrightarrow HSO_4^- + H_3O^+$
  - H_2SO_4: acid. H_2O: base. Amphoteric.

* Acid + Base ⟶ Salt + water
  $HCl + NaOH \longrightarrow NaCl + H_2O$] neutralization reaction.

- strong acids:-

monprotic acid — HCl, HBr, HI, HNO_3, H_2SO_4 (diprotic).

- weak acids:-

HF, CH_3COOH (mono), H_3PO_4 (triprotic).

- Strong Bases:-

$NaOH$, KOH, $Ca(OH)_2$, $Mg(OH)_2$

- weak Bases:-

NH_3, H_2O

a) HNO_3 ⟶ mono
b) H_2SO_4 ⟶ di
c) H_3PO_4 ⟶ tri
d) NH_3 ⟶ base

« Electrolyte »

NaCl

Ionic Comp.

- dissociated (ionized) in water → Conduct electricity → Electrolyte

- All ionic comp. electrolyte.

HCl , HBr , HI

- Strong 100% ionize →
  - ionic comp.
  - HCl, HBr, HI
- weak partial ⇌
  - HF
  - vinegar (acetic) $HC_2H_3O_2$
  - H_3PO_4

$C_6H_{12}O_6$

Molecular comp.

dissolve in water → cannot conduct electricity → nonelectrolyte

- All molecular comp. nonelectrolyte exept acids.
  - glocuse $C_6H_{12}O_6$
  - CH_4
  - C_8H_{18}

« Acid-Base »

- Arrhenius :-

• Acid :- sub in aq → H^+

$H^+ + H_2O \longrightarrow H_3O^+$ hydronium ion.

$HCl_{(aq)} \longrightarrow H^+ + Cl^-$

↳ $H^+ + H_2O \longrightarrow H_3O^+$

• Base :- sub in aq → OH^- hydroxide ion

$NaOH_{(aq)} \longrightarrow Na^+ + OH^-$

« Solution Concentration »

- Molarity = $\frac{\text{no. of solute (mol)}}{\text{Volume of solution(L)}} = \frac{n}{V}$ = mol / L

- solvant ⟶ The great amount.
- solute ⟶ The smallest amount

* Calculate the molarity of a solution made from 20.0g of NaOH in 250mL of solution?

- 20 g NaOH $\times \frac{1 \text{ mol NaOH}}{40 \text{ g NaOH}}$ = 0.5 mol NaOH

- $V = \frac{250 \text{ mL}}{1000} = 0.250 \text{ L}$

- $M = \frac{n}{V} = \frac{0.5}{0.25} = 2 M$ or 2 mol/L

« Dilution »

* $M_1 V_1 = M_2 V_2$ ⟶ 3

100 ⟶ 10

⟶ x

- $V_1 = \frac{M_2 V_e}{M_1} = \frac{10 \times 3}{100} = 0.3 \text{ L} = 300 \text{ mL}$

* What's the concentration of a solution formed by diluting 5.0 mL of a 3.2 M of glucose solution to 40.0mL?

- $M_1 V_1 = M_2 V_2$
- $M_1 = 3.2$ · $V_1 = 5 \text{mL}$
- $M_2 = ?$ · $V_2 = 40 \text{mL}$

$M_2 = \frac{M_1 V_1}{V_2} = \frac{3.2 \times 5}{40} = 0.4 M$ glucouse.

$2H_2S_{(g)} + 3O_2 \rightleftharpoons 2H_2O_{(g)} + 2SO_{2(g)}$

.if add H_2S:-
- shift right - more product - Forward is favorite.

. إذا كانت المادة المضافة (s) أو (l) ليس هناك تأثير.

.: Volume - Pressure :-

$\uparrow P = \downarrow V$

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

1 + 3 → 4 ; 2 → 2

.inC. pressure:- → Shift to the direction of fewer number of moles.

.dec. pressure:- ← shift to the direction of large number of moles.

$CuS_{(s)} + O_{2(g)} \rightleftharpoons Cu_{(s)} + SO_{2(g)}$

(2) (2)

.inc. vo.:- no change. , no effect.

$2H_2S_{(g)} + 3O_{2(g)} \rightleftharpoons 2H_2O_{(g)} + 2SO_{2(g)}$

(5) (4)

. inc. vol. :-
shift to the ~~right~~ left.

. dec. vol. :-
shift to the right.

Ch-5

Chemical Equilebreum:-

$$H_{2(g)} + I_{2(g)} \underset{\text{forward}}{\overset{\text{reverse}}{\rightleftharpoons}} 2HI_{(g)}$$

The rate of the forward reaction equal the rate of reverse reaction.

Reactants $\rightleftharpoons$ Products

$K = [\ ]$ ⟶ Concentration.

$$K = \frac{[\text{products}]^x}{[\text{Reactants}]^x}$$

$$K = \frac{[HI]^2}{[H_2] \cdot [I_2]}$$

g = gas ✓
aq = aques ✓
S = Solid ✗
ℓ = liqued ✗

- $CH_3OH_{(g)}$ ✓ $\rightleftharpoons$ $CO_{(g)}$ ✓ + 2 $H_{2(g)}$ ✓

$$K_f = \frac{[CO][H_2]^2}{[CH_3OH]}, \quad K_{re} = \frac{[CH_3OH]}{[CO][H_2]^2}$$

- $CO_{2(g)}$ ✓ + $H_2O_{(\ell)}$ ✗ $\rightleftharpoons$ $H^+_{(aq)}$ ✓ + $HCO_{3(aq)}^-$ ✓

$$K_f = \frac{[H^+] \cdot [HCO_3^-]}{[CO_2]}, \quad K_{re} = \frac{[CO_2]}{[H^+] \cdot [HCO_3^-]}$$

- $2CO_{(g)}$ ✓ $\rightleftharpoons$ $CO_{2(g)}$ ✓ + $C_{(s)}$ ✗

$$K_f = \frac{[CO_2]}{[CO]^2}$$

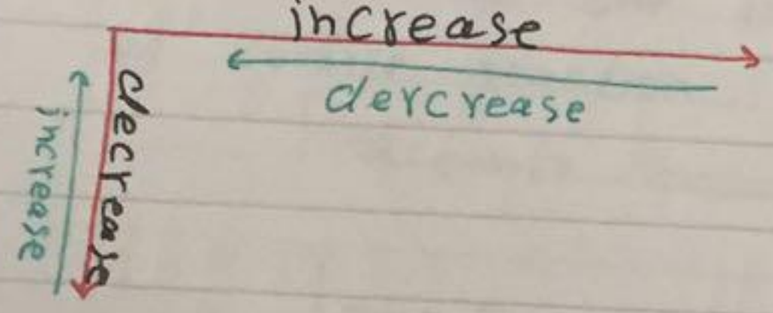
$CaCO_{3(s)}$ ✗ $\rightleftharpoons$ $CaO_{(s)}$ ✗ + CO_2 ✓

- $K = [CO_2]$

$$K_{reverse} = \frac{1}{[CO_2]}$$

« Electronigativity »

- The ability to attract shareed e^-.
- 0 - 0.4 :- non-polar bond.
- 0.5 - 2.0 :- polar bond.
- > 2.0 :- Ionic bond.
- 0 :- pure bond.



- Metalic Bond :- Sea pool e^-.

NH_4^+

. Arrhenius :-

- **Acid :-** substance aq. sol $\longrightarrow H^+$, $H^+ + H_2O \longrightarrow H_3O^+$

$$HCl \longrightarrow H^+ + Cl^-$$

- **Bases :-** substance in aq. sol $\longrightarrow OH^-$

$$NaOH \longrightarrow Na^+ + OH^-$$

. Bronsted- Lowry :-

- Acids :- H^+ donor.
- Bases :- H^+ acceptor.

. Conj. pairs :- NH_3 / NH_4^+

. " " :- H_2O / OH^-

. $NH_3 + H_2O \longrightarrow NH_4^+ + OH^-$

bases Acid Conj. Acid Conj. base.

. $H_2SO_4 + H_2O \longrightarrow HSO_4^- + H_3O^+$

Acid Base Conj. base. Conj. Acid.

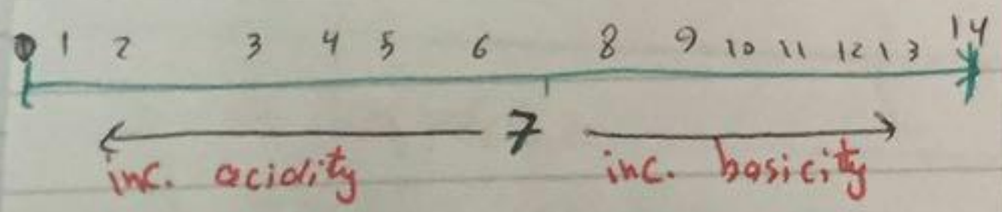
H_2O :- Amphoteric.

⊖ غالباً القاعده المرافقه .

⊕ غالباً الحمض المرافق .

~~Lewis :-~~ . pH :-

$$- pH = - \log [H_3O^+]$$



. $pH < 7$:- acidic.

. $pH > 7$:- basic.

. $pH = 7$ neutral.

Conj. Acid - Base pair :-

HCl	Cl^-
H_2SO_4	HSO_4^-
H_3O^+	H_2O
NH_4^+	NH_3
H_2O	OH^-

Acids

strong →

- HCl → mono
- HBr → mono
- HI → mono
- H_2SO_4 → di
- HNO_3 → mono

weak ⇌

- HF ← mono
- H_2CO_3 ← di
- CH_3COOH ← mono
- H_3PO_4 ← tri

Bases

strong →

- $NaOH$
- KOH
- $Ca(OH)_2$
- $LiOH$
- $Mg(OH)_2$

weak ⇌

- NH_3
- H_2O

• Internal energy :- (E)

• The sum of Kinetic and Potential Energy.

• $\Delta E = q + W$ → work
↳ heat
↳ internal energy.

• $W = -P\Delta V$ → change in volume.
work ↳ pressure, atm

- W : J
KJ = 1000 J
- q : J

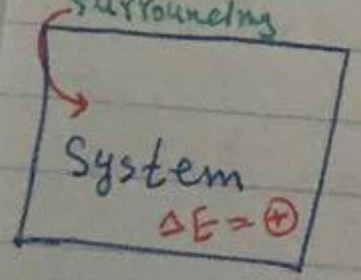
1 atm = 101.3 J

• a baloon expands in volume from 2L to 6L against constant pressure of 1.2 atm. Calculate the work :-

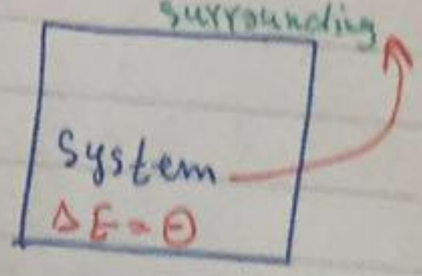
$W = -P\Delta V \Longrightarrow = -1.2 \times (6-2) = -4.8 \times 101.3$

$= -7.8 \times 10^2$ J $= -480$ J $= -0.48$ KJ

Quantifying Heat and Work :-



• Sys. $\Delta E = \oplus$
absorb.



• Sys. $\Delta E = \ominus$
release.

• endo :- inner, absorb.
• exo :- outer, release, involve.

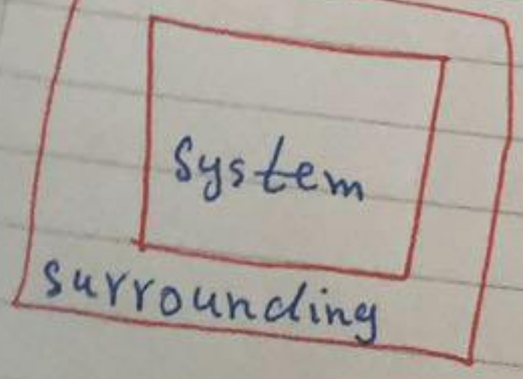
• $q = C \cdot \Delta T$ → Change of temp.
↳ constant. heat capacity
↳ heat

The Periodic Table of Eleme

- Types of energy :-

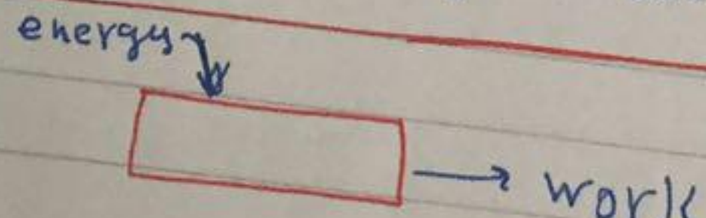
Kinetic Energy
- associated with motion.
- heat
- optical (radiaut)
- wind
- electrical

Potetial Energy
- stored energy
- Chemical
- electrostatic
- neuclear.
- ~~gravitational~~
- gravitational
- electromagnitic.

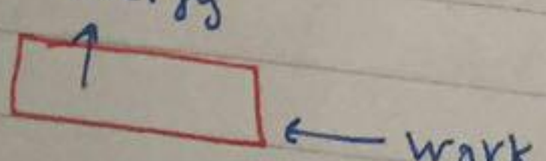


- open system :-
  - energy change
  - matter change.
- Closed system :-
  - energy change
  - matter cannot change.
- isolated system :-
  - energy , matter cannot change.

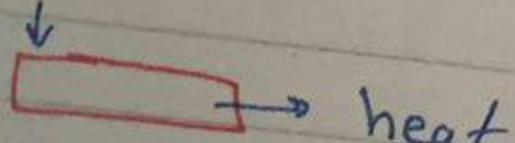
$W < 0$
- negative.



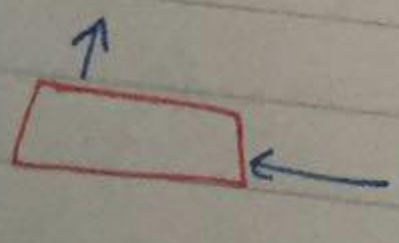
$W > 0$
- positive.



$q < 0$
- negative



$q > 0$
- positive



$A + B \longrightarrow C + D$ $\quad \Delta H = -230$
exothermic.

$A + B \longrightarrow C + D$ $\quad \Delta H = 500$
endothermic.

∴ Temp. :-

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)} + heat$

- add more heat :-
  - shift to the ~~left~~ left.
  - K is smaller.
- take more heat :-
  - shift to the right.
  - K is larger.

$N_2O_{4(g)} \rightleftharpoons 2NO_2$ ∴ endothermic

- add more heat :-
  - more products.
  - K is larger.
- take more heat :-
  - more reactants.
  - K is smaller.

∴ Acids - Bases :-

- Acid :- sour taste
  - Blue L.P → Red.
- Bases :- slippery touch.
  - Red L.P ⟶ blue.

· Lewis acid :-

① BF_3 , BCl_3 , BBr_3 . الهالوجينات من كل

② $AlCl_3$. من باقي الهالوجينات

③ Al^{+3} , كل المعادن التي ذي كذا

④ CO_2

⑤ NH_4^+ ⑥ H_3O^+

· Lewis bases.

① NH_3

② H_2O

③ $R-\ddot{O}-R$

« Acid-Base Definitions »

Type	Acid	Base
~~Ash~~ Arrhenius	H^+ producers.	OH^- producer.
Bronsted-Lowry.	H^+ donor.	H^+ acceptor.
Lewis	elec. pair acceptor.	elect pair donor.

cold

heat

Ch-6

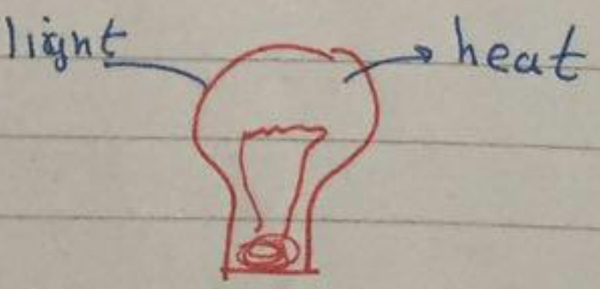
- therodynamic:- the study of relationship between heat , work , energy.
- theroChemistry:- The therodynamic of chemical reactions.

- heat:- The energy transfer from a hot object to a cold object.
- tempretare : a mesurment of the thermal energy.
- energy :- The capacity to do work.
- power :- The capacity to do something
- work :- The energy required to move an object against a force.

- law of conservation of energy:-
  * Energy cannot be created nor destroyed.
- The first law of thermodynamic :-
  * Energy in a univers is constant.

- forms of energy :-

Energy is all around you



you can hear energy as sound.
you can see energy as light.
you can feel energy as wind.

C-C

C-C
Single :.

C=C
double :.

C≡C
Triple :.

• Hydro carbons :-

Counting Carbon + hydrogen.

- Alkane
  - -ane
  - $-C_nH_{2n+2}$
  - methane CH_4
  - ethane C_2H_6
- Alkene
  - -ene
  - $-C_nH_{2n}$
  - ethene C_2H_4
    - ethylene.
- Alkyne
  - -yne
  - $-C_nH_{2n-2}$
  - ethyne C_2H_2
    - acetylene
- Aromatic
  - -ring
  - $-C_nH_{2n-6}$
  - benzyne.

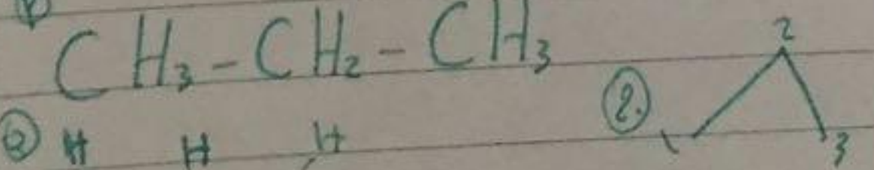
- C_6H_{10} :- Alkyne.
- C_6H_{14} :- Alkane.
- C_6H_{12} :- Alkene.
- C_6H_6 :- Aromatic.

• Alkanes :-

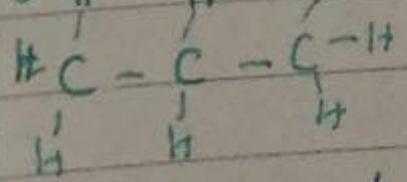
① C-C Single bond.

② first member is methane.

③ $CH_3-CH_2-CH_3$



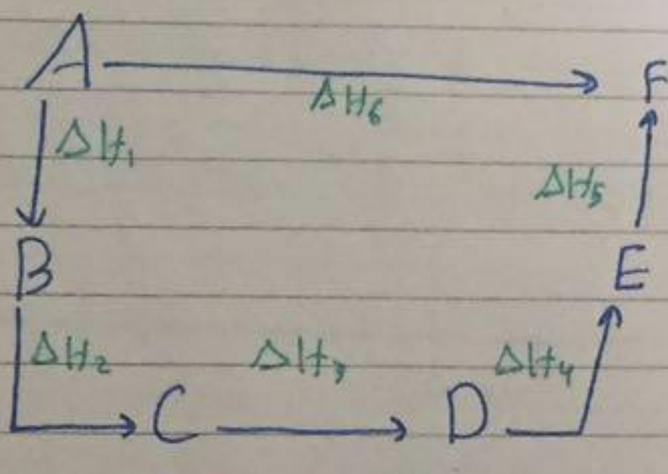
④



⑤ saturated hydrocarbons.

• Hess's Law :-

if a reactant is a carried out in series (multiple) steps, ΔH for the reaction will be equal to the sum of the enthalpy changes for the individual steps.

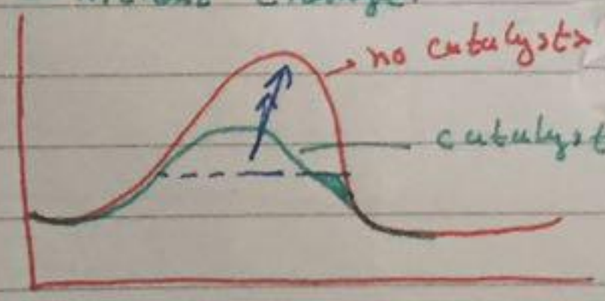


$\Delta H_6 = \Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4 + \Delta H_5$

OR $\sum_{\Delta H_5}^{\Delta H_1}$

• Catalysts :-

- The substance that (accelerate) increases the rate of a Chemical reaction without itself consumed.
  (without change)
- Lower (decrease) the activation energy.



Catalysts

- homogenous
  reactant + catalysts in the same phase (state)
- heterogenous.
  reactant + Catalysts in different phase state

• Enthalpy :- (H)

It is the amount of heat content absorbed used or released in a system at constant pressure.

• change in enthalpy :- (ΔH)

- $\Delta H = H_f - H_i = q_p$.
  - $H_{product} - H_{reactant} = q_p$.

Energy
- C = KiloCalory
- c = Calory.
- J

• Calorimetry :-

A Calorimetry is a device used to measure the quantity of heat transferred to or from an object

bomb Calorimetry
- at constant Volume.
- used high temp.
- used in gases.
- used in solids

Caffee-cup Calorimetry.
- at constant pressure.
- used low temp.
- not used in gases.
- used in solution only.
  - liquids.

- heat capacity :- (C)

The quantity of heat required to change the tempreture of the system by 1 C°

- heat capacity unit :- J/c°

- Specific heat capacity :- (C_s)

The quantity of heat required to change the tempreture of 1 g of the substance by 1 C°

Specific heat capacity :- J/g.c°

- $q = m \cdot C \cdot \Delta t$ ⟶ change of temp.
  - q → heat
  - m → mass
  - C → specific heat

- 25 g of Al is coolded from 310c° to 37c°

what amount of energy (J) is lost by Al ? $C_s = 0.897 J/g.c°$

* $q = m \cdot C \cdot \Delta t \Longrightarrow = 25 \times 0.897 \times -273$

$= -6120 J = -6.12 KJ$

$\Delta T = T_f - T_i$

$= 37 - 310 = -273c°$

---

zinc 20c° ⟶ 28C°

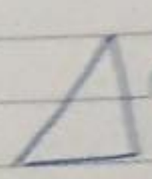
35.8g $C_s = 0.388 J$

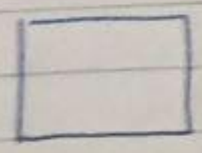
$q = m \cdot C \cdot \Delta t \Longrightarrow = 35.8 \times 0.388 \times 8 = 111 J$

Periodic Table of Elem

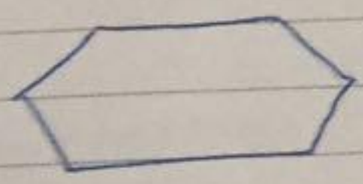
• Cycloalkane :-

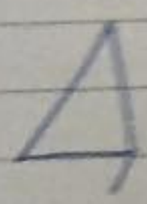
- at least 3 carbon.
- C_nH_{2n}
- first member is Cyclopropane

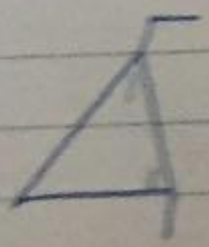

Cyclopropane.

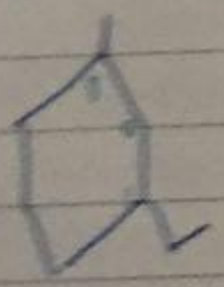

Cyclobutane.

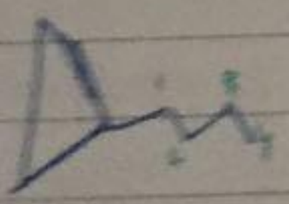

Cyclopentane.


Cyclohexane.


methyl Cyclopropane.

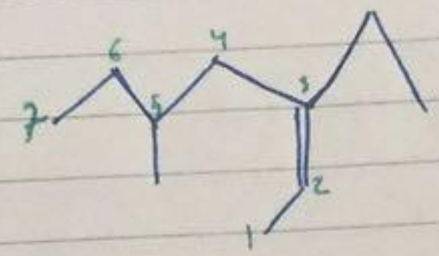

Ethyl-2-methyl Cyclopropane.


1-ethyl-2-methyl Cyclohexane.

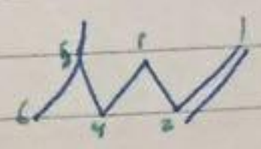

Cyclopropyl butane.

• Alkene: $H_2C=CH_2 \Longrightarrow C_nH_{2n}$

- first member is ethene → ethylene.
- unsaturated hydrocarbons.



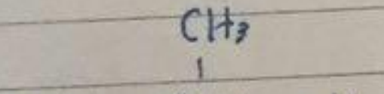
3-ethyl-5-methyl-2-heptene.



5-methyl-1-hexene.

$CH_3-CH_2-CH_2-CH_3$ butane. C_4H_{10}

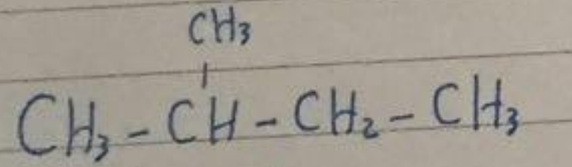
Isomers.



2-methy propane. C_4H_{10}

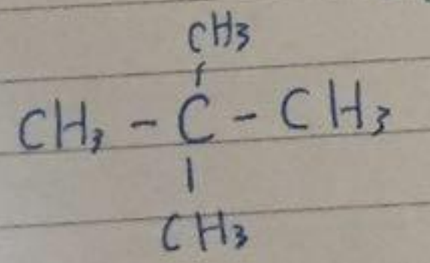
$CH_3-CH_2-CH_2-CH_2-CH_3$

n- pentane C_5H_{12}

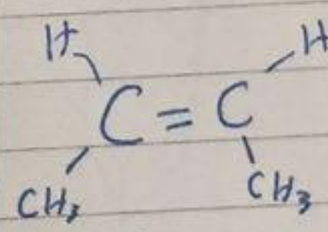


isopentane

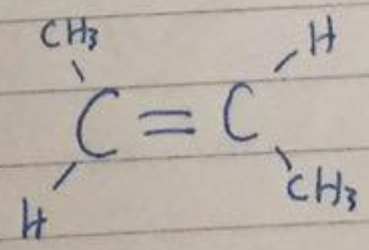
Isomers



neopentane.



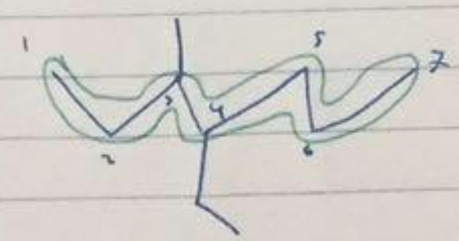
- Cis.



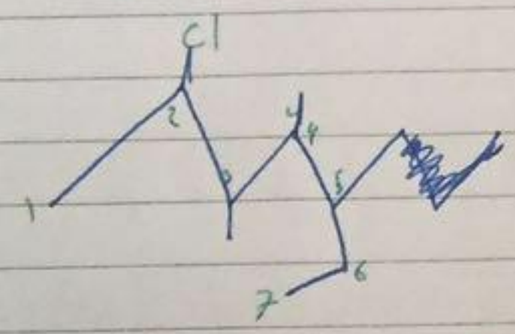
- trans.

• Nomenclature of Alkane :-

prefex ← no. of C → Suffex



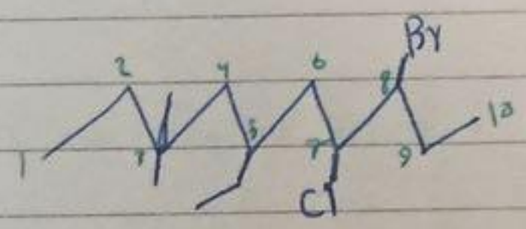
4-ethyl, 3-methyl heptane



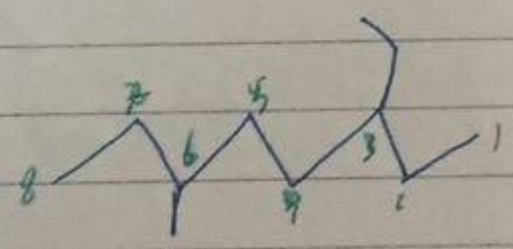
2-cloro → 3, 4, 5-trimethyl heptane

• الهلوجيات دائمًا في الاول

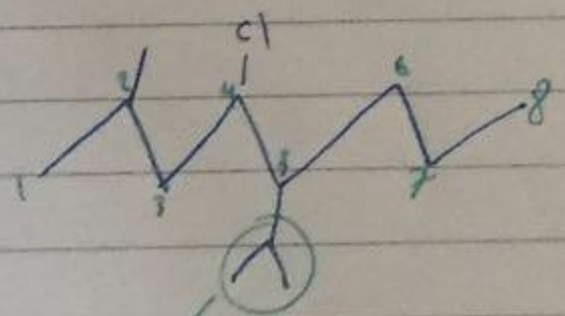
• إذا فيه أكثر من هالوجين
ترتبهم هجائيًا.



8-Brom-7-Cloro-5-ethyl-3,3-dimethyl decane.



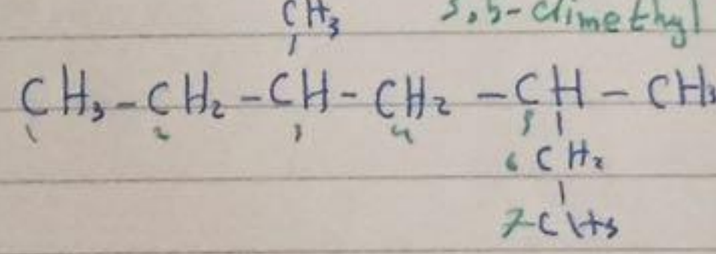
3-ethyl-6-methyl octane.



→ isopropyl

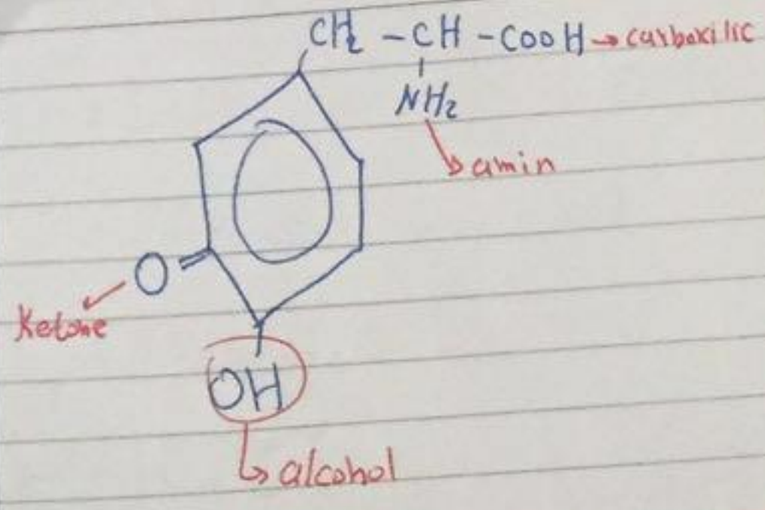
• انتبه من الآيزو ∴

3,5-dimethyl heptane



4-cloro-5-isopropyl-2-methyl octane.

7



(a) alcohol

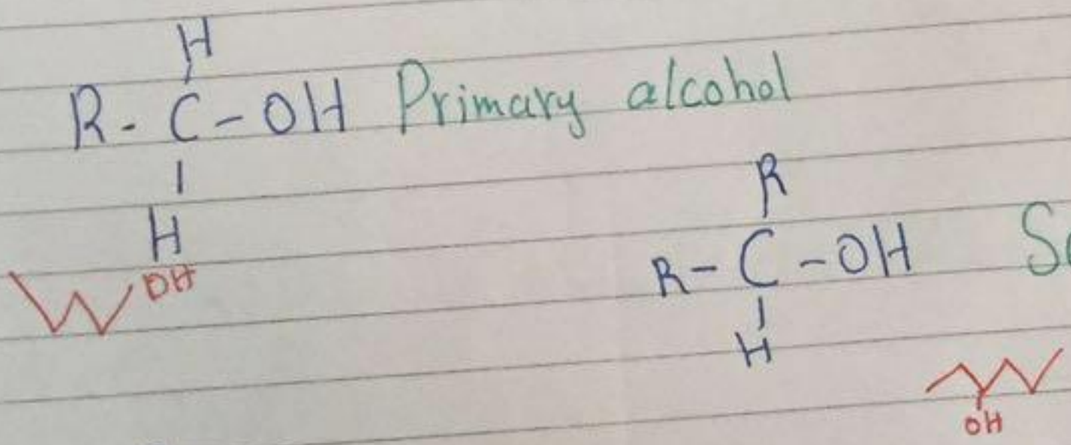
(b) Carboxilic

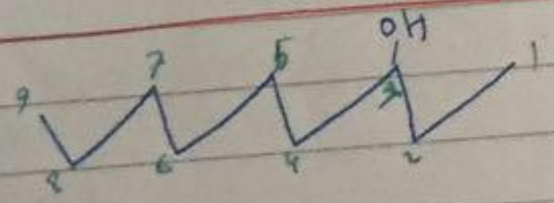
(c) Ketone

(d) Aldehycle

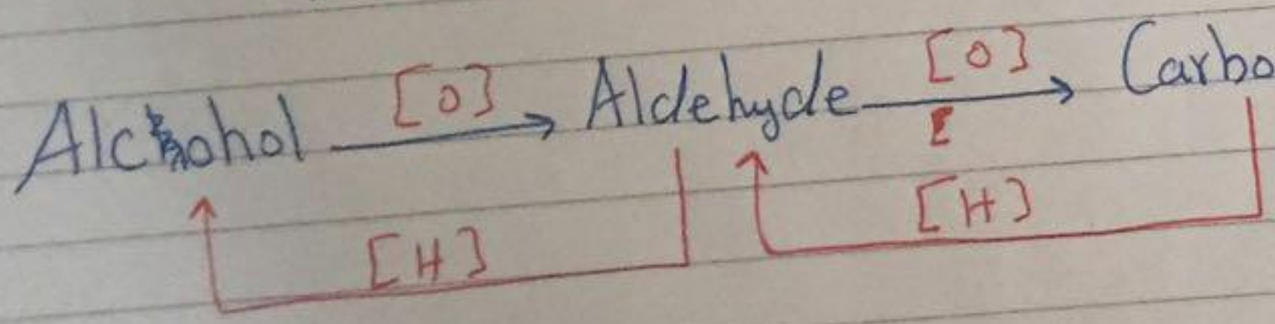
(e) Amine

- Alcohol :- R-OH





3-nonanol



• Ethers :- R-O-R

Alcohol + Alcohol ⟶ H_2O + ether.

• Aldehyde :-

- $R-C(=O)-H$

=al

• Ketone :-

$-R-C(=O)-R$

- one

$CH_3-C(=O)-CH_3$

Acetone.

• Ester :-

$R-C(=O)-OR$

Carboxylic Acid + Alcohol ⟶ H_2O + ester

- hydrolysis with water

Carboxilic acid + Alcohol.

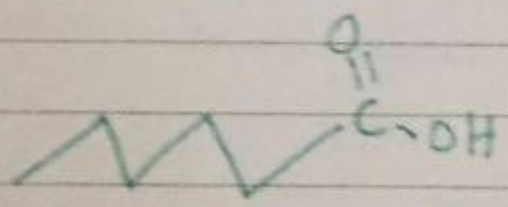
- hydrolysis with alkali :

Soap . this called saponification.

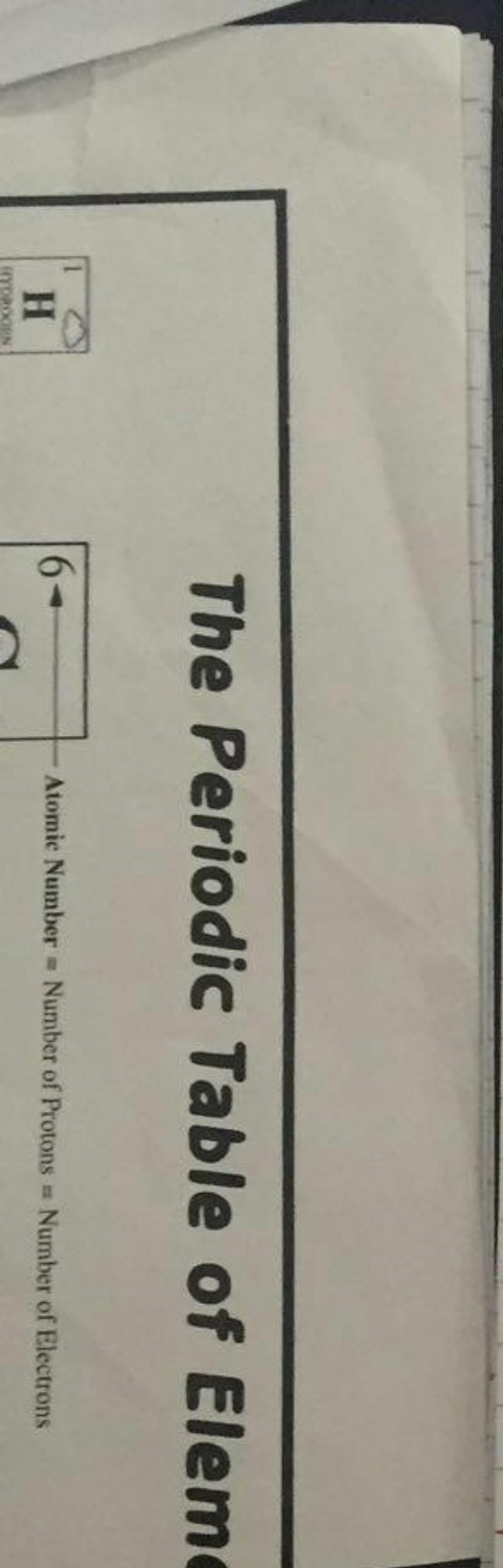
• Carboxilic Acids :-

- $R-C(=O)-OH$
- $R-COOH$
- $R-CO_2H$

- oic acid



heranoic acid.



Ch-7

• Organic Chemistry :- (C)

C-C

- C-C — Single :.
- C=C — double :.
- C≡C — Triple :.

• Hydro carbons :-

Counting Carbon + hydrogen.

Alkane	Alkene	Alkyne	Aromatic
-ane	-ene	-yne	-ring
$-C_nH_{2n+2}$	$-C_nH_{2n}$	$-C_nH_{2n-2}$	$-C_nH_{2n-6}$
• methane CH_4	• ethene C_2H_4	• ethyne C_2H_2	• benzyne.
• ethane C_2H_6	↳ ethylene.	↳ acetylene	

- C_6H_{10} :- Alkyne.
- C_6H_{14} :- Alkane.
- C_6H_{12} :- Alkene.
- C_6H_6 :- Aromatic.

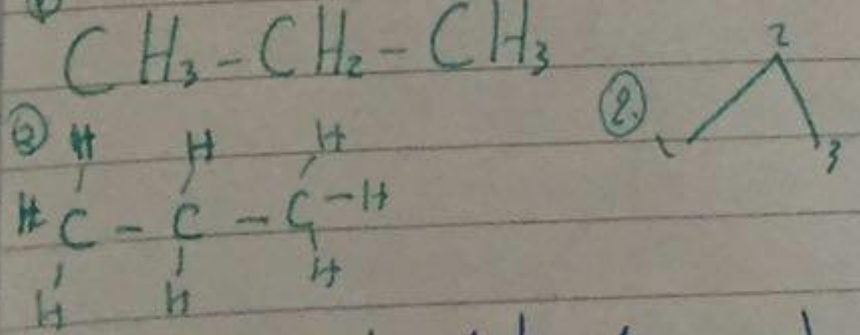
• Alkanes :-

① C-C Single bond.

② first member is methane.

③ $CH_3-CH_2-CH_3$

④



⑤ saturated hydrocarbons.

Hydrocarbons

- **Saturated**
  - **Alkane** C_nH_{2n+2} — methane
  - **Cycloalkane** C_nH_{2n} — cyclo propane
- **Unsaturated.**
  - **Alkene** C_nH_{2n} — Ethylene
  - **Alkyne** C_nH_{2n-2} — Acetylen
  - **Aromatic** C_nH_{2n-6} — benzene.

الألكينات اقوى من الألكينات

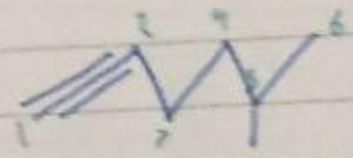
الألكينات اقوى من الألكانات

• Functional groups:-

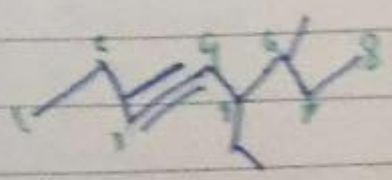
- **without carbonyl group** $C=O$
  1. $CH_3-\boxed{OH}$ -alcohol
     $R-OH$
  2. Amine or Amino
     CH_3-NH_3
     $R-NH_3$
  3. ether
     $R-O-R$
- **with carbonyl group**
  1. $R'-C(=O)-H$ aldehyde
  2. $R'-C(=O)-R$ ketone
  3. $R'-C(=O)-OH$ carboxylic
  4. $R'-C(=O)-OR$ ester
  5. $C(=O)-NH_2$ Amide

• Alkynes :-

- yne
- C_nH_{2n-2}
- ~~acety~~ acetylene.
- unsaturated hydrocarbon.



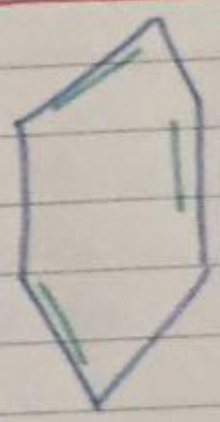
5-methyl-1-hexyne.

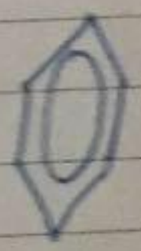


5-ethyl-6-methyl-3-octyne.

• Aromatic :-

- Arene.
- first member is Benzene C_6H_6

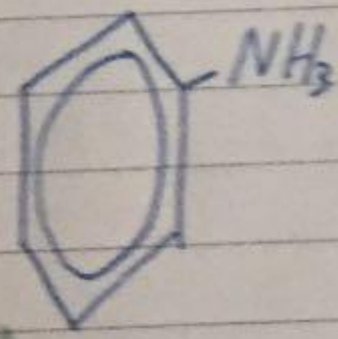




benzene

Toluene

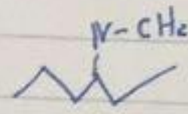
Phenol

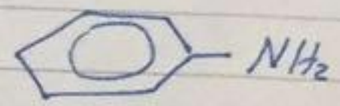


Aniline

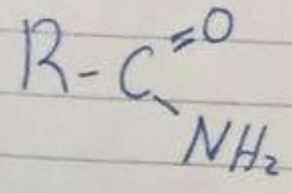
- Amine :-

- $R-NH_2$





- Amide :-

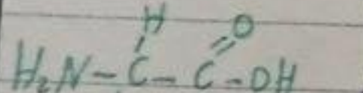


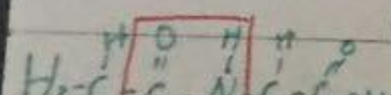
Biochemistry

protein

Amino Acids

20





peptide bond.

- amino.
- carboxilic.

Carbohydrates

glucose

① monosaccharide

- Ribose } 5C
- Deoxyribose }
- glucose }
- fructose } 6C
- galactose }

② disaccharide :-

- Succorose :- tablesugar
  glucose + fructose
- Lactose :- Milk sugar
  glucose + galactose.
- Maltose :-
  glucose + glucose.

③ polysaccharide :-

- Animal
  - glycogen
- Plants
  - starch
  - cellulose.

Lipids

Glycerol + fatty acids

- estrification.
- Triglyceride :-

oil :- Liquid, unsaturated.

Fats :- solid, saturated.

Nucleic Acids

nucleotides

- nitrogen base
- phosphate
- sugar.

- DNA :-