* Basic of chemistry:

Velency:

1- Monovalent: H– , X– (–F, –CL, –Br, –I)

2- Divalent: –Ö– , –S̈–

3- Trivalent: –N̈–

4- Tetravalent: –C–

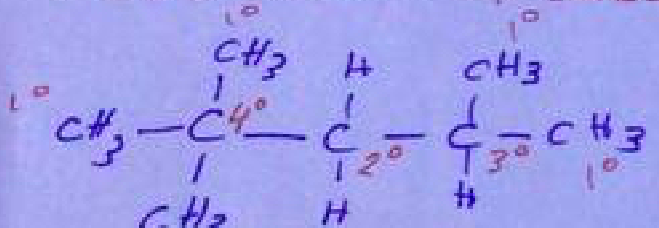
* Connection between Carbon-Carbon:

1- single bond — Alkane — –C–C–

2- Double bond — Alkene — $H_2C=CH_2$

3- Triple bond — Alkyne — H–C≡C–H

* classification of carbon: 1°, 2°, 3°, 4°



7° alcohol

* the function group take the carbon classification that it attached to.

* Chemical bond:

1- Ionic bond
↓
ions
Cation → Loss of ē
anion → gain of ē

2- covalent bond
↳ sharing of electron [illegible]
↳ to reach most stable (octet Rule)

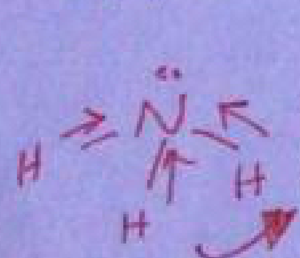
polar (0.5-2)

Non-polar (0-0.5)

size ↓ , E.N ↑ →
size ↑ , EN ↓ ↓

C N O F
CL
Br
I

* Dipole moment μ = e.d (dibye)
↙ polar → μ ≠ 0
→ Non polar → μ = 0



μ ≠ 0 (Polar)

H_2O → polar

μ = 0 Non-polar

Two types of Bond

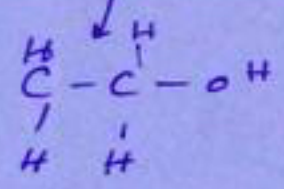
1- Sigma bond σ
- ↳ Strong bond
- ↳ head to head → S + Px
  - → Px + Px

S O Px ∞
Pz 8 Py ∞

2- Pi bond π
- ↳ Weak bond
- ↳ side by side → Pz + Pz
  - → Py + Pz

Molecular formula and structural formula :

C_2H_6O

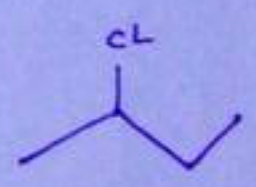


How to draw structure:

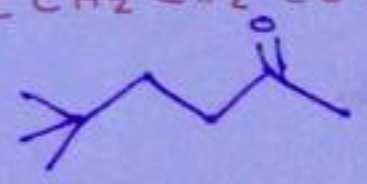
- Dash formula
- Condensed formula $CH_3\,CH_2CH_3$
- Bond line (skeletal)
- Dot formula ∝

problems :

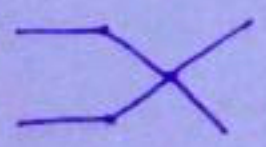
1- $CH_3\,CH(Cl)\,CH_2\,CH_3$



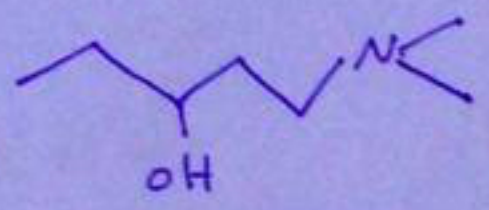
2- $(CH_3)_3\,C\,CH_2\,CH_2\,Co\,CH_3$



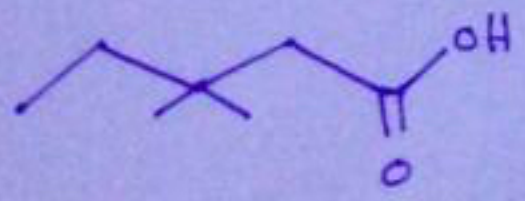
3 $(CH_3CH_2)_2\,C\,(CH_3)_2$



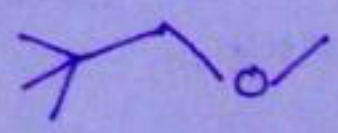
4- $CH_3CH_2\,CH(OH)\,CH_2\,CH_2\,N(CH_3)_2$



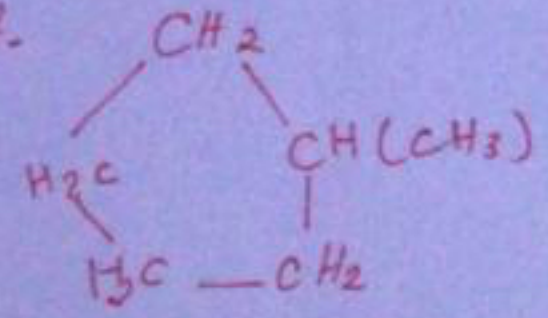
5- $CH_3\,CH_2\,C(CH_3)_2\,CH_2\,Co_2H$



6- $(CH_3)_3\,C\,CH_2\,O\,CH_3$



7.



Hydrocarbons
C, H only

- Aliphatic
  - Saturated
    - Alkanes
      * C_nH_{2n+2}
      * σ- band only
      * -ane
  - Unsaturated
    - Alkenes
      * C_nH_{2n}
      * 1π
      * -ene
    - Alkynes
      * C_nH_{2n-2}
      * 2π
      * -yne
  - Alicyclic
    - cyclo alkanes

cyclohexane

- Aromatic

C_6H_6

* Types of Reactions:

1- Addition Reaction (الاضافة تكون عندي π ضعيفة عشان أكسرها وأضيف

$CH_2 = CH_2 + H_2 \longrightarrow H_3C - CH_3$

or Cl_2 or HCl or H_2O

2- Elimination Reaction نزع/الحذف (بنشيل عشان نكون رابطة

$H_3C - CH_2(OH) \xrightarrow{conc.\ H_2SO_4} CH_2 = CH_2 + H_2O$

3- Substitution reaction استبدال

$CH_4 \xrightarrow[\Delta/UV]{Cl_2} CH_3Cl + HCl$

---

* Hyperdization:

s □ O

p □□□ (p_x p_y p_z)

p_x ∞ p_y ∞ p_z 8

* σ Sigma
  - → $p_x + p_x$ ∞ ∞
  - → $s + p_x$ O∞

* π
  - → $p_z + p_z$ 8 8
  - → $p_y + p_y$ 8 8

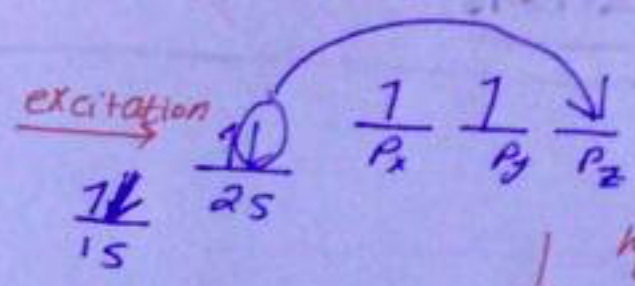
* sp^3 — no π band — Alkane
* sp^2 — π — Alkene
* sp — 2π — Alkyne

sp^3

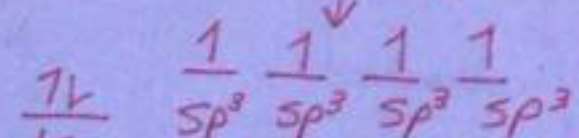
ex : CH_4

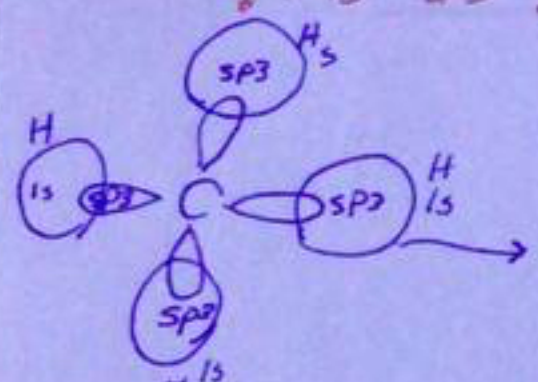
$C_6 : 1s^2\ 2s^2\ 2p^2$

excitation



hyperdization





$C \rightarrow S + sp^3$

sp^3 → tetrahedral

109.5°

1 : 3

%25 : %75

%S : 25%

---

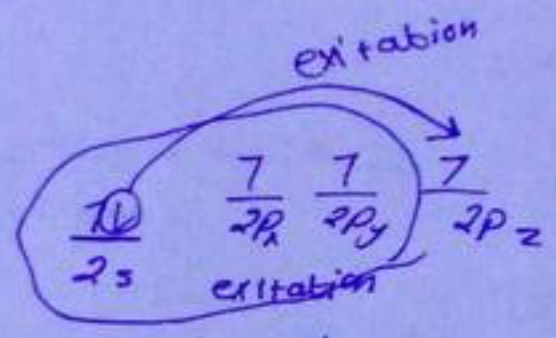
sp^2

ex : $H_2C = CH_2$

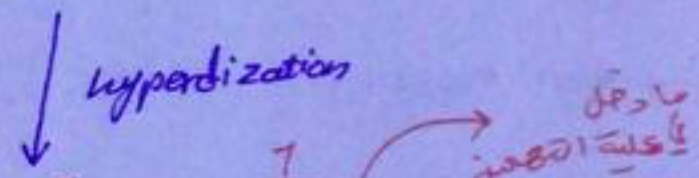
(I) Ethene

(C) Ethylene

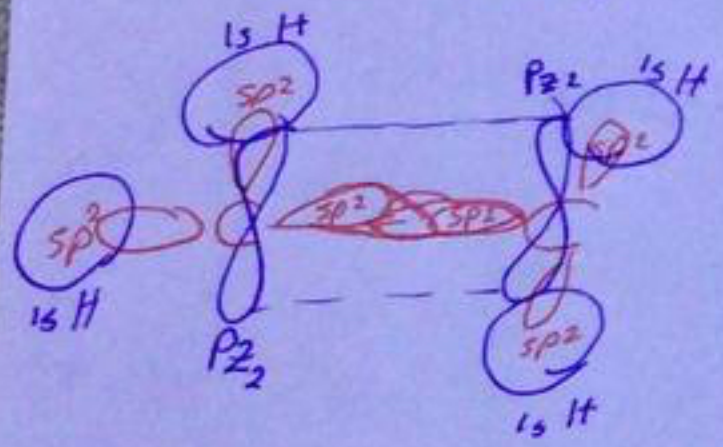
$C_6 : 1s^2\ 2s^2\ 2p^2$



hyperdization



ما دخل بالعملية التهجين لأنها هي التي ستكون الرابطة π



sp^2 → trigonal planer

120°

%S = 33.3%

---

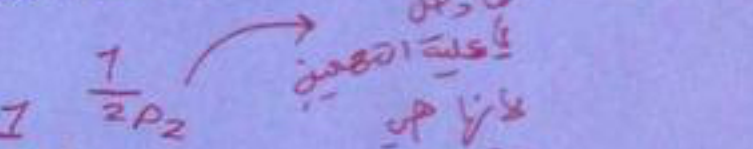
sp

$H - C \equiv C - H$

(I) (Ethyne)

(C) Acetylene

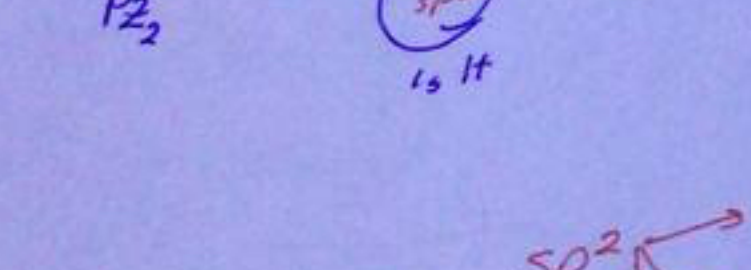
$C_6 : 1s^2\ 2s^2\ 2p^2$



1- excitation

2- hyperdization

لا يدخلوا في التهجين لأنها π



sp → Linear

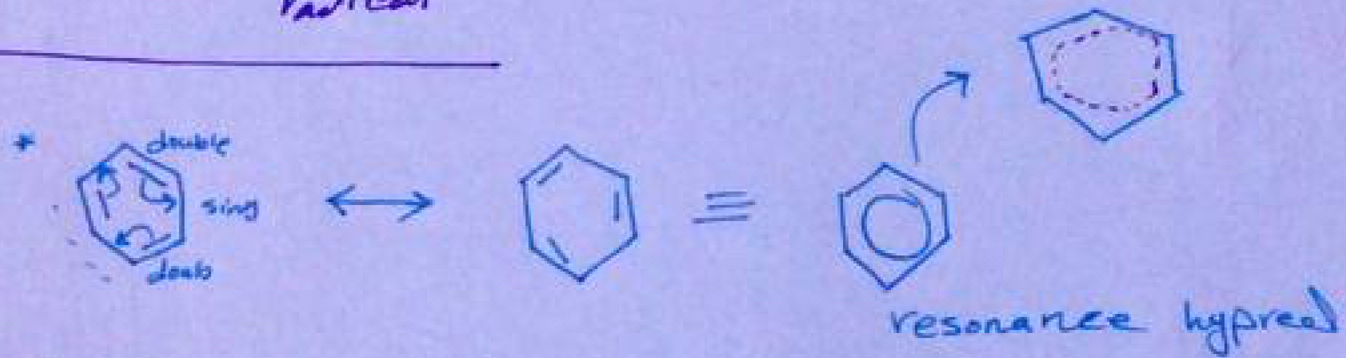
180°

%S = 50%

Conditions

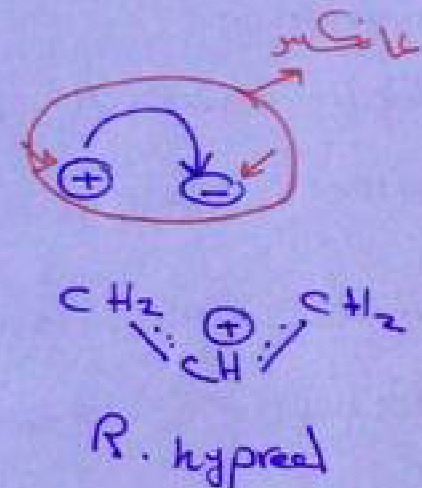
الـ stability - تتناسب تناسب عكسي مع الـ Energy

1. = — = — = —
2. = — $C^{\oplus}$
3. = — $C^{\ominus}$
4. = — $\ddot{X}$ (أي اشي)
5. = — $\dot{C}$ (radical)



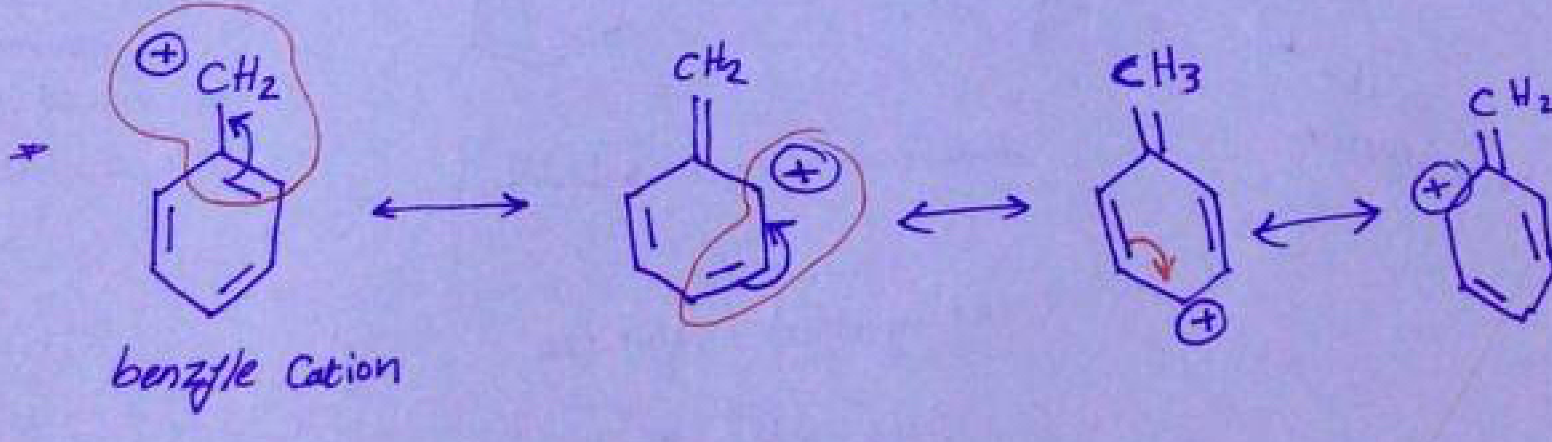
* $H_2C=CH-\overset{\oplus}{C}H_2 \leftrightarrow H_2\overset{\oplus}{C}-CH=CH_2 \equiv$

Allyl Cation



* $H_2C=CH-\overset{\ominus}{C}H_2 \longleftrightarrow H_2\overset{\ominus}{C}-CH=CH_2$

Allyl anion



* $H_2C=CH-\dot{C}H_2 \longleftrightarrow H_2\dot{C}-CH=CH_2$

Allyl Radical

* $H_3C-\overset{\oplus}{C}H-\ddot{N}H-CH_3 \leftrightarrow H_3C-CH=\overset{\oplus}{N}H-CH_3$

	SP^3	SP^2	SP
			2π
1-	no π	1π	
2-	Alkane (−)	Alkene (=)	Alkyne (≡)
3-	Th	T.P	L
4-	109.5°	120°	180°
5- S%	25%	33.3%	50%

كل ما زادت نسبة SP بتزيد نسبة ارتباط s بالنواة

$HCN \rightarrow H-C\equiv N$

→ Strength ↑
length ↓
acidity ↑

---

* Resonance: → مم لأنه بزيد ال stability

???

1. Delocalization of electrons — ē بتتحرك وحركة ال ē هي اللي بتعطي ال Resonance
2. Atoms NEVER move, only electrons move.
3. All resonance structres have the same number of electrons and net charge.
4. According to resonance effect, the greater the number of resonance contributors, the greater the resonance stabilization effect.

resonace contributer (structure)

علاقة ال Resonance

double → single → double - ...

بنسميه Conjugated system ← نظام متبادل

كل ما كان المركب أكثر resonance
كل ما كان المركب أكثر stable