

VEIN BATCH 2027

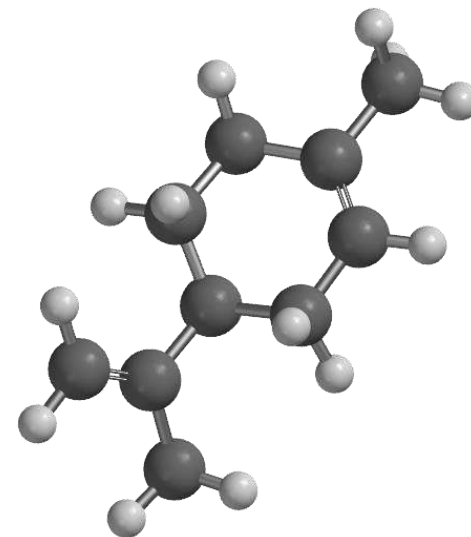
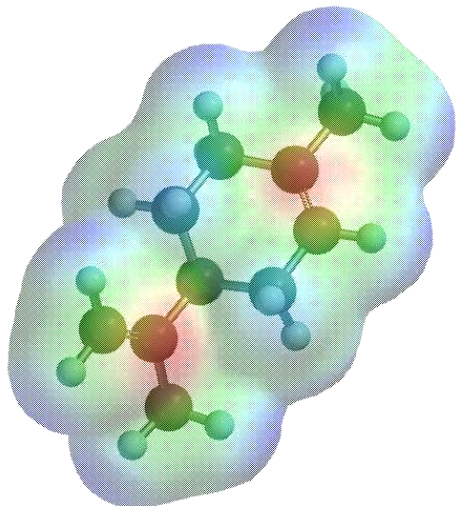


Sub: Organic المادة:

Lecture: *chapter 3* المحاضرة:

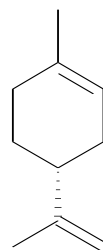
By: Johainah Taha إعداد:

Edited: تعديل:



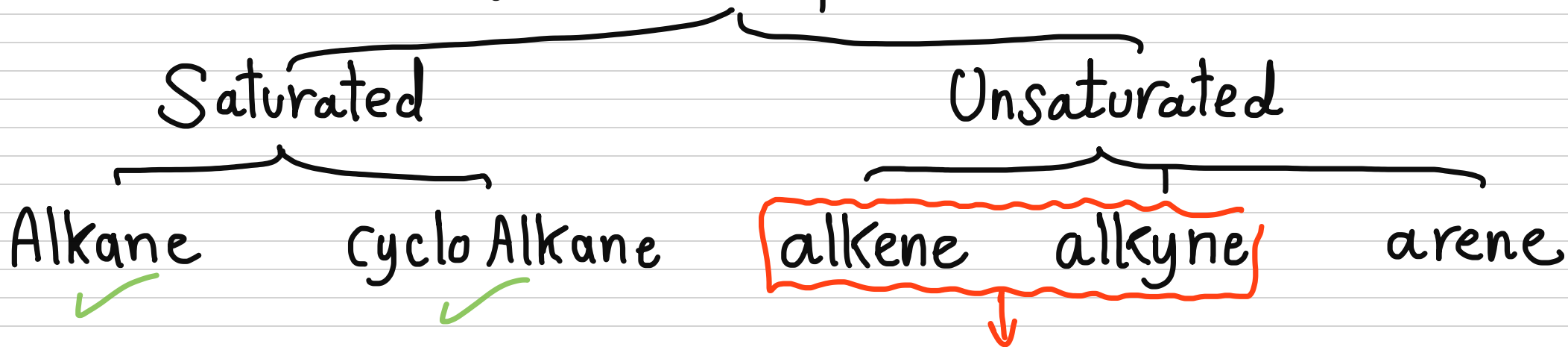
Chapter 3: Alkenes and Alkynes

Done by : Johainah Taha



Indorex

تحدثنا سابقاً على اننا احنا بنقصد hydrocarbon اللى



In this chapter
😊

Single bond اقوى من ال double bond ال note

General Properties

Alkenes contain double bonds and alkynes triple bonds. Both classes of compounds are hydrocarbons, containing only C and H atoms.

- a double bond consists of 1 σ and 1 π bond,
- a triple bond consists of 1 σ and 2 π bonds.

Hybridization
double bond \downarrow sp^2
triple bond \downarrow sp



alkane



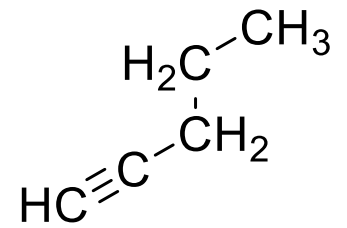
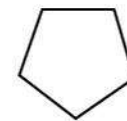
molecular formula



alkene



cyclic alkane



Alkynes



Every π bond results in the loss of a pair of H atoms.

سؤال؟؟ كم مول من H_2 يفرق الألكين عن الألكاين؟

1 mole

طيب كم مول من H_2 يفرق الألكات عن الألكاين؟

2 moles

سؤال؟؟ ار $alkene$ و $cycloalkane$ الهم نفس
ار $formula$ ، فشر بنطق عليهم؟؟

Structural isomers - Constitutional

الهم نفس $molecular formula$ ولكن $structure$ و صفات مختلفة

سؤال؟؟ كم مول من H_2 يفرق $alkane$ عن $cycloalkane$ ؟؟

1 mole

General Properties (cont'd)

قد يش أننا بحتاج mole of H_2 حتى يصير molecule زي
saturated acyclic structure ←

The Index of Hydrogen Deficiency (IHD) can give an idea of possible structures based on the ratio of C to H. This is a count of the number of H_2 molecules needed to obtain the corresponding saturated acyclic structure. The IHD is also equal to the number of rings and π bonds in the molecule.

What is the IHD of the following:-

Alkene \rightarrow 1 mole

Alkyne \rightarrow 2 moles

cyclic alkane \rightarrow 1 mole



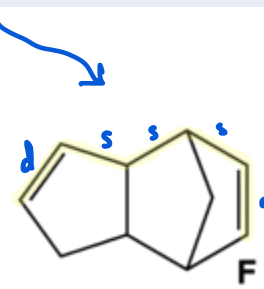
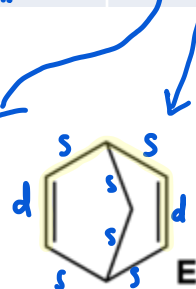
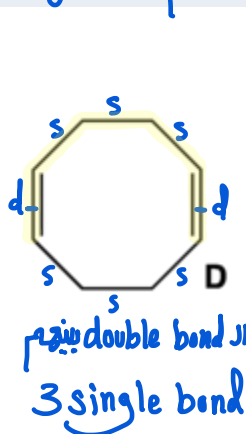
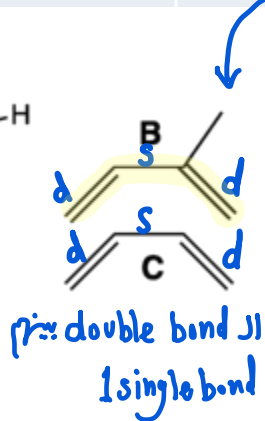
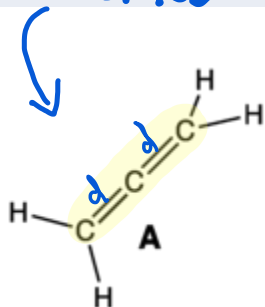
\rightarrow 2 moles

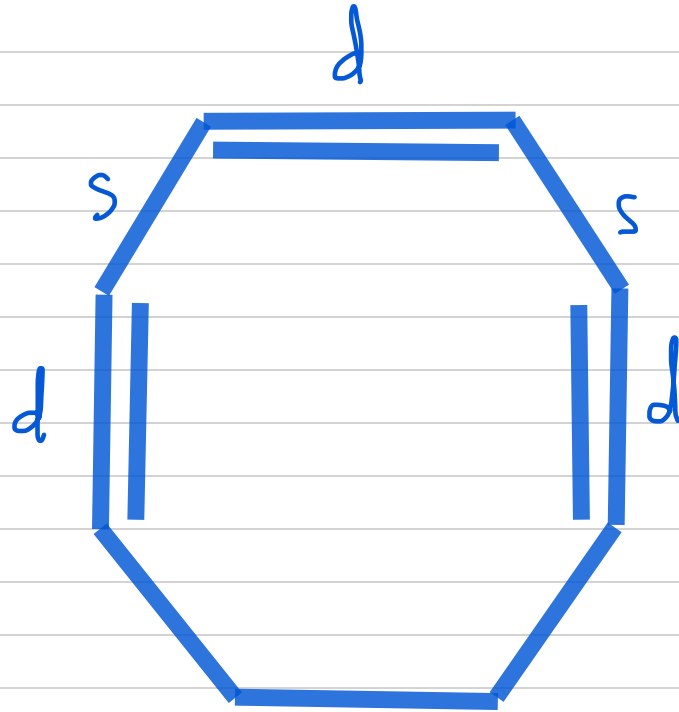
With multiple double (or triple) bonds three possible arrangements arise: cumulated, conjugated or isolated (non-conjugated). Conjugated are especially important as the π bonds can interact.

مهم

توضیح

Cumulated	Conjugated	Isolated (non conjugated)
$C=C=C$ ↑ ↑ ورا بعض	$C=C-C=C$ ↑ s ↑	$C=C-C-C=C$ ↑ ↑
$C=C=C=C$ ↑ ↑ ↑ ورا بعض	$C\equiv C-C\equiv C$ Single 1 في بينهم	$C\equiv C-C-C-C\equiv C$ ↑ ↑



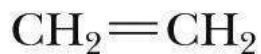


و هاد بنسخته Conjugated

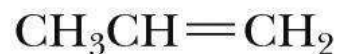
- Parent → longest chain → should contain double bond.
 - suffix → -ene
 - rules → نقل ترتيب → = double bond (عش) other substituent.
- IUPAC Nomenclature of alkenes

- Use the Suffix **-ene** to show the presence of a carbon-carbon double bond.
- Number the parent chain to give the 1st carbon of the double bond the lower number.
- Follow IUPAC rules for numbering and naming substituents.
- For a cycloalkene, the numbering of the atoms of the ring must begin with the two carbons of the double bond.

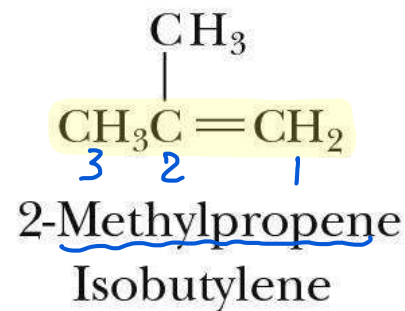
- Some alkenes, particularly low-molecular-weight ones, are known almost exclusively by their common names.



IUPAC name: Ethene
 Common name: Ethylene

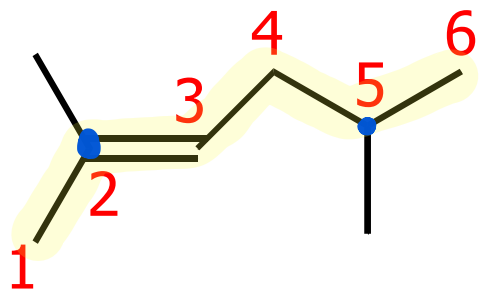


Propene
 Propylene



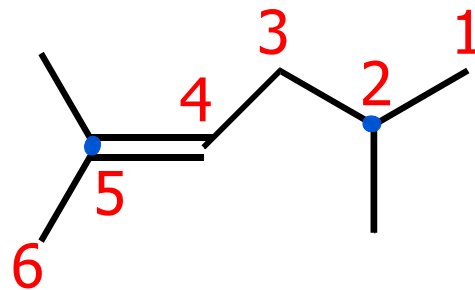
note
 3 Carbons واكش لازم عدد رقم از double bond

Number the chain in the direction that gives the functional group the lowest number.

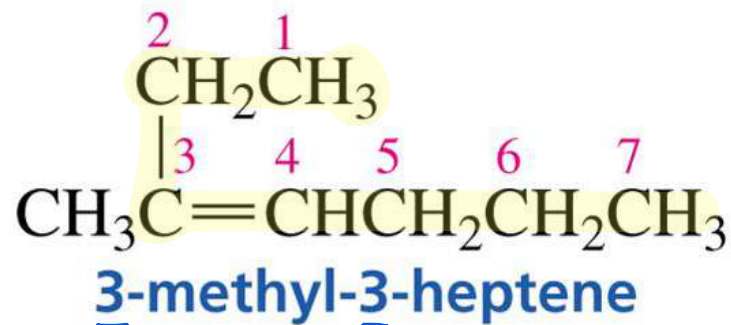
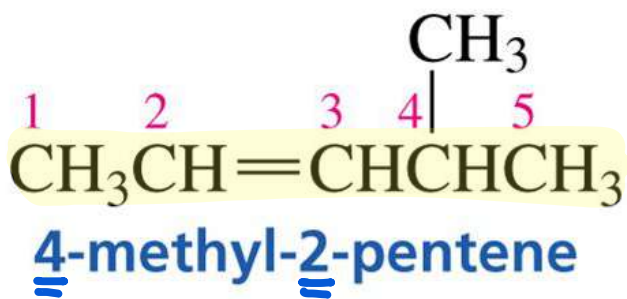


2,5-Dimethyl-2-hexene

NOT



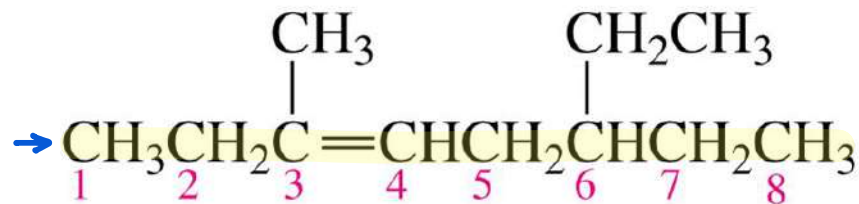
2,5-Dimethyl-4-hexene



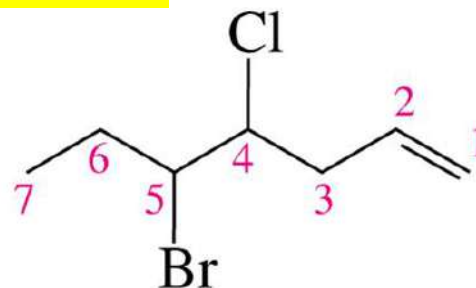
substituent w ←

↑
number of double bond

Substituents are stated in alphabetical order.



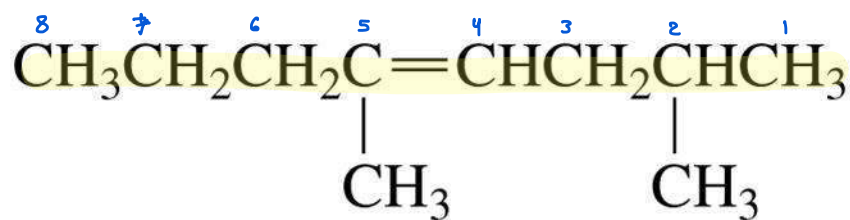
6-ethyl-3-methyl-3-octene



5-bromo-4-chloro-1-heptene

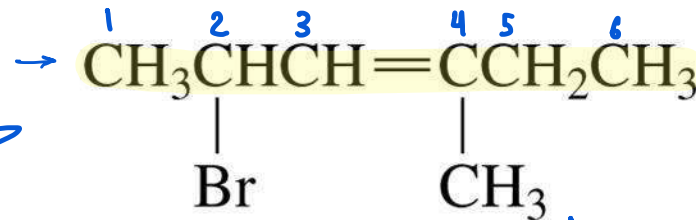
more than 3 carbons
لازم نكتب الترتيب حتى لو كان واحد

Hw:

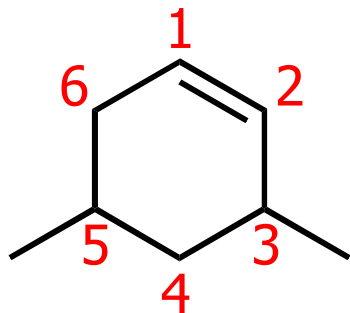


2,5-Dimethyl-4-octene

Check it

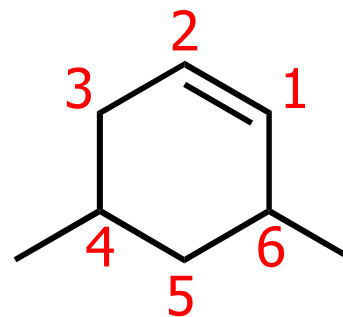


2-bromo-4-methyl-3-hexene



3,5-Dimethylcyclohexene

NOT

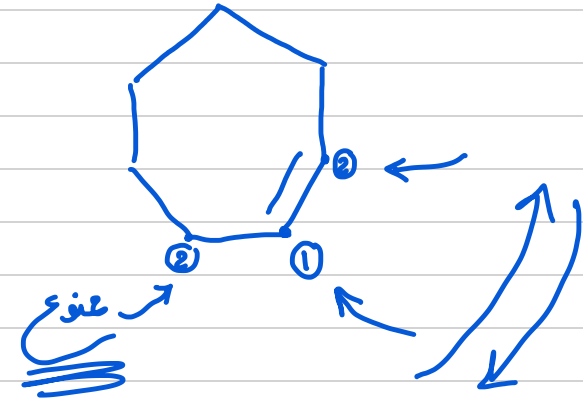


4,6-Dimethylcyclohexene

Cycloalkene :-

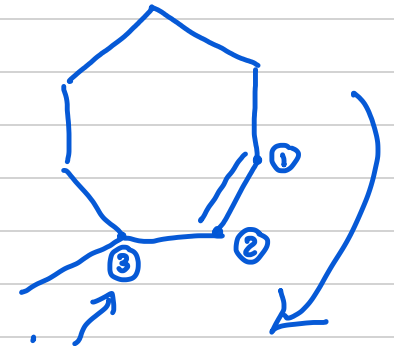
كيف ما تسمى رقم 1 هي التي بتكون ال double bond

هون يامع عقارب او عكس عقارب الساعة
بشروط نفس على double bond .



في حال وجود Substituent بدنا حاول نعطيهما أقل ترقيم :-

هون لازم مع عقارب الساعة لان
Substituent حكمتي .



اعطيهما رقم 3 بدل رقم 7

• IUPAC nomenclature of alkynes نفس الكلايم فياير

- Use the infix **-yne** to show the presence of a carbon-carbon triple bond.
- Number the parent chain to give the 1st carbon of the triple bond the lower number.
- Follow IUPAC rules for numbering and naming

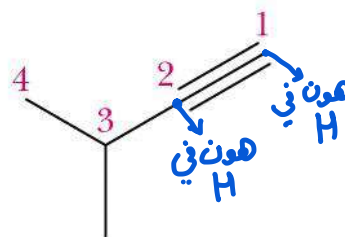
substituents.

ملا حفاة هامة

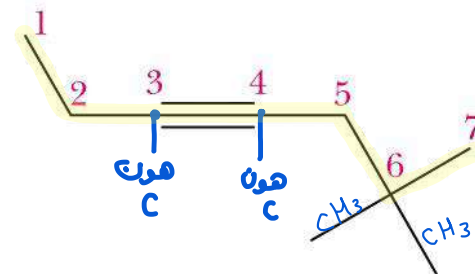
التعبير عن triple يكون



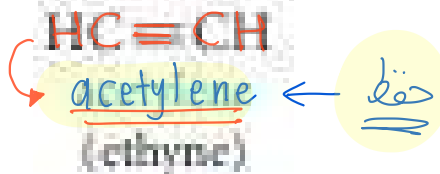
لا يظ linear
- Common Name:



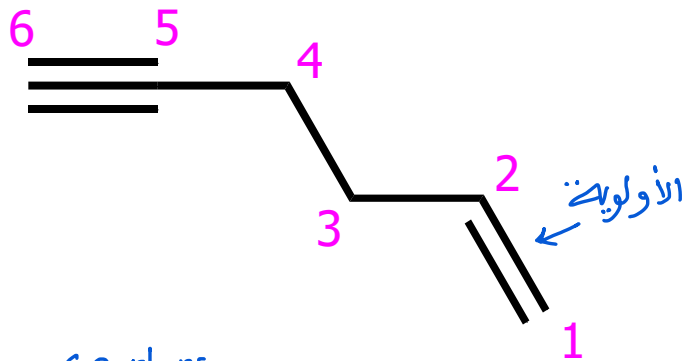
3-Methyl-1-butyne



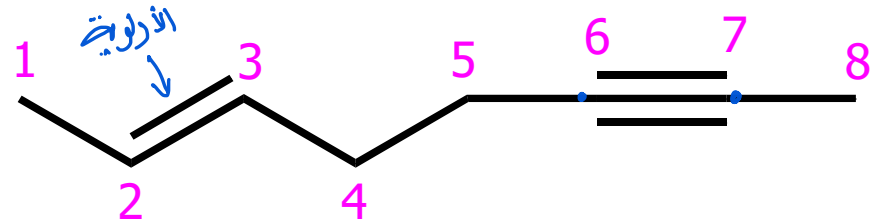
6,6-Dimethyl-3-heptyne



في بعض الحالات يكون في بنفس المركب double مع triple



6 carbons
Hex-1-en-5-yne
 double triple



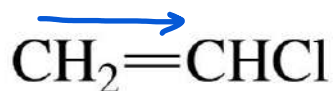
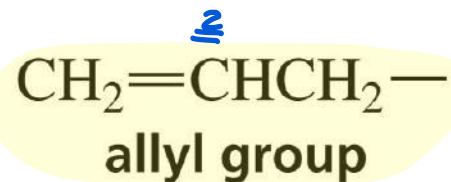
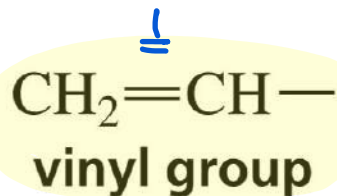
8 carbons
(2E)-Oct-2-en-6-yne
 double triple

هاي مومطلوبت
 منا الآت
 ✓

Vinyl and Allyl Groups

A vinyl group is the smallest group that contains a vinylic carbon.

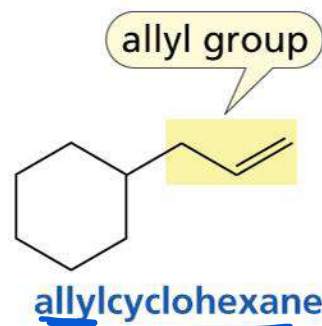
An allyl group is the smallest group that contains an allylic carbon.



common name: vinyl chloride
systematic name: chloroethene

allyl bromide
3-bromopropene

The substituent is on the vinylic or allylic carbon.



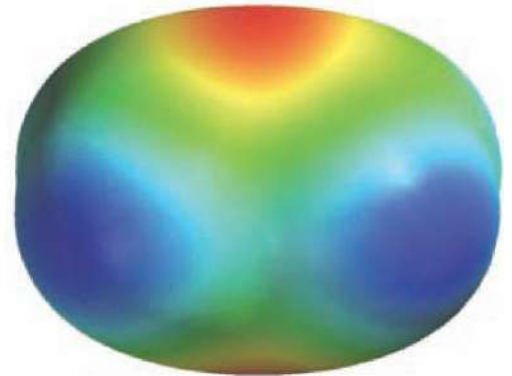
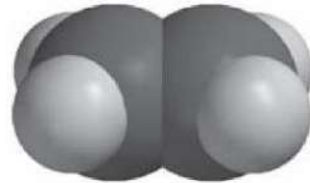
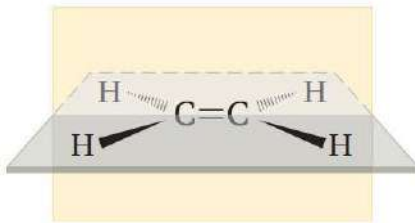
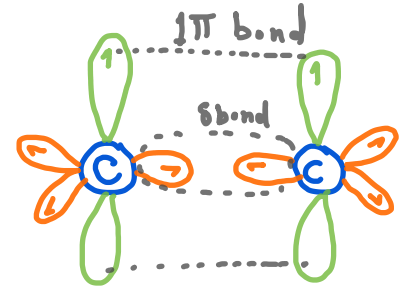
عوزن اوكيل ووكيزا ليستا
اوكيل

Bonding in Alkenes

35:0

1 π \swarrow 1 sigma

- Alkenes are sp^2 hybridized
- Trigonal planar – bond angle $\sim 120^\circ$
- 3 σ and 1 π bond (or 2 single and 1 double)
- C=C double bond $\sim 1.34 \text{ \AA}$
- The π bond lock the geometry to planar

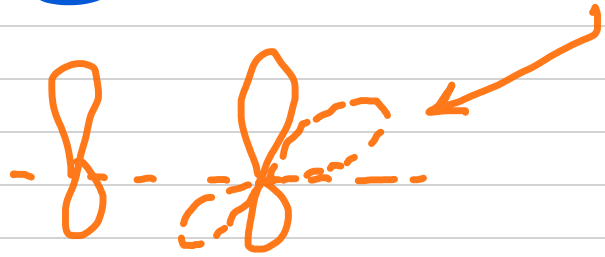


تعالوا نحكي عن π :

* حكيما لحتى نكون π bond لازم يكونوا 2 Porbitals \leftarrow side to side وعلى

نفس axis \leftarrow يعني parallel :

* كيب لو بدنا نعمل ال rotation وألفه 90° اباي حتى كسر وتروح ويكن
لو لفيته 180° بتضل موجودة.



فالتالي rotation غير مسموح في الألكينات والألكاينات
لأنه يتسبب في كسر π bond .



طيفي سؤال؟ في حال لو ار rotation غير مسموح عندي لو
 عملنا rotation بمقدار 180° شو جيبس بار atom؟



مثل ما اتقوا ملاحظين بسبب ار rotation الي عملته بار P orbital انقلب
 اماكن الذرات (H و Cl) وهدول شو؟؟ ياسلام عليكم هذول isomers بختلفوا في
 orientation تبع Cl ، فيا بكونوا مع بعضنا او عكس بعض .

وهذول ار isomers بنطلق عليهم Geometric isomers او cis-trans isomers .