Chapter 3: Alkenes and Alkynes

Introduction:- They are unsaturated hydrocarbons, alkenes have C=C and general formula C_nH_{2n} (as cycloalkanes).

Alkynes have C≡C and general formula C_nH_{2n-2}.

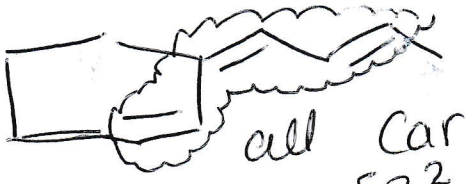
Examples: ☐ $CH_3-\overset{H}{\underset{|}{C}}=\overset{H}{\underset{|}{C}}-CH_3$ C_4H_8

$CH_3-C\equiv C-CH_3$ C_4H_6

C_nH_{2n-2}

Cumulated structure: C=C=C

Conjugated structure: C=C-C=C-C=C-C=C



all carbons sp^2

Isolated structure:-

C=C-C=C-C*-C=C-C=C-C=C

sp^3 carbon

Nomenclature of alkanes and alkynes:-

* Use the same IUPAC rules that mentioned for alkanes, except:

a) select the longest carbon chain that contains BOTH C=C or (C≡C)

b) Number the chain from the end nearer to double or triple bond. (If numbering is equidistant

⇓

number the chain from end nearer to 1st substituent

⇓ If equidistant

number the chain from end based on alphabetical order of substituent

c) Indicate the position of C=C or C≡C, using a lower number

d) The parent name is ended by:

~~ene~~ for alkene

~~yne~~ alkyne

Examples of alkenes:

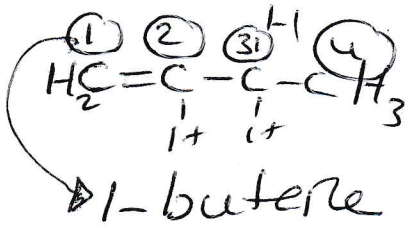
$H_2C=CH_2$

Ethene

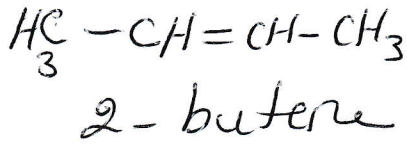
(Ethylene)

$CH_3-CH=CH_2$

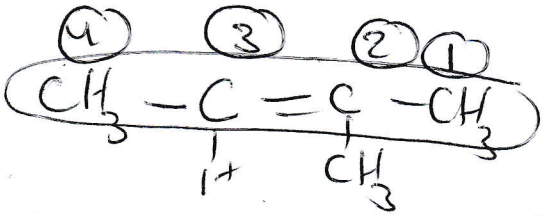
Propene



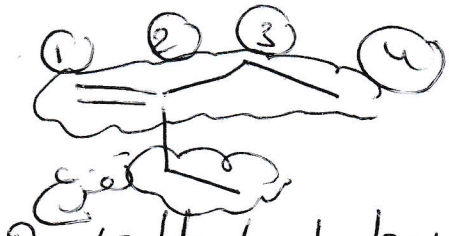
1-butene



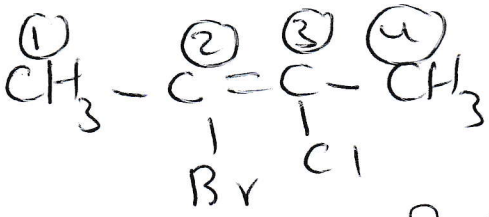
2-butene



2-Methyl-2-butene

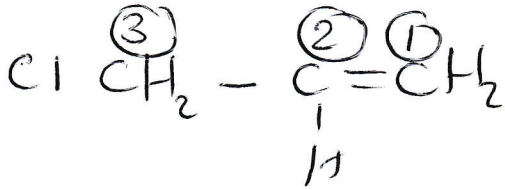


2-Ethyl-1-butene



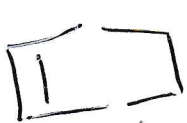
2-Bromo-3-chloro-2-butene

Alphabetical order.



3-chloro [ ] propene

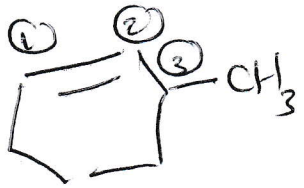
* For cycloalkenes:



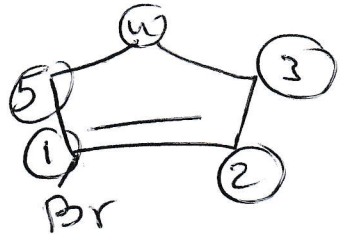
cyclohexene

cyclohexene

cyclohexene

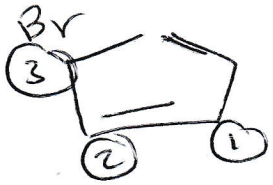


3- Methyl cyclohexene



1-Bromo cyclo pentene

cyclopropene

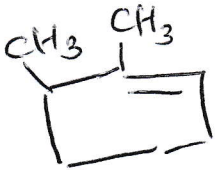


3- Bromo cyclo pentene
(Not 5- Bromo cyclo pentene)

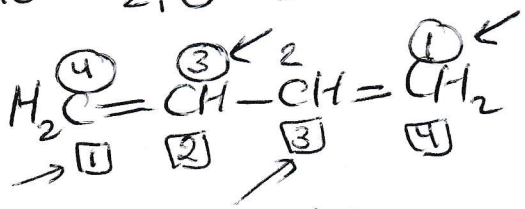
or

1, 4- Cyclo hexadiene

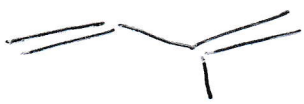
1, 3- Cyclo hexadiene



1,6- Dimethyl cyclohexene
(not 2,3- Di

* 

1,3-butadiene
(not 1,3-di butene)



2-Methyl-1,3- butadiene

$H_2C=CH-CH=CH-\underset{\underset{H}{|}}{C}=CH_2$

1, 3, 5- hexatriene

Examples of Alkynes:

$H-C\equiv C-H$

Ethyne

(Acetylene)

6,6,6-Trichloro-1-hexyne

$CH_3-C\equiv C-CH_3$

2-butyne

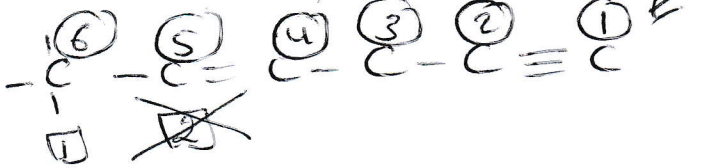
$CH_3-CH_2-C\equiv CH$

1-butyne

Notes:

① If molecule contains C=C and C≡C:

a)  Start numbering: alkene

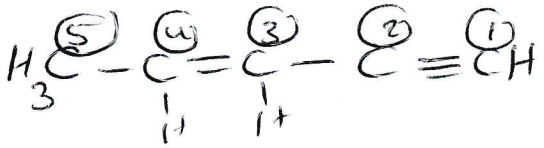
b)  : alkyne.

c)  Equidistant ???

Start numbering from alkene

$H_2C=CH-C\equiv CH$ 1-buten-3-yne

first parent

 3-penten-1-yne