Aromatic Compounds - II

Course on General Organic Chemistry for Class XI

SURENDRA K MISHRA • Lesson 14 • Aug 31, 2021

NUCLEUS EDUCATION
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IIT - ORGANIC CHEMISTRY

NURTURE

Corporate Office: NAIVEDHYAM, Plot No. SP-11, Old INOX, Indra Vihar,
Kota (Raj.) 324005

DPP # 02

Time : 30 Min.

1. **Statement 1 :** Urea is an organic compound. **[3]**

Statement 2 : It can be synthesized only by living organism.

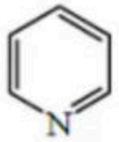
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

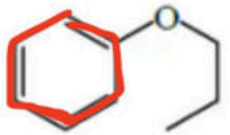
(C) Statement-1 is true, statement-2 is false.

(D) Statement-1 is false, statement-2 is true.

2. Compound which is not heterocyclic - **[3]**

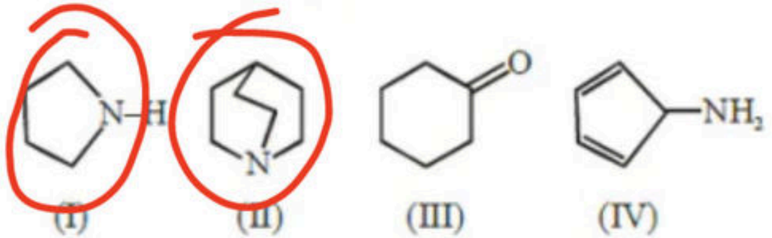
(A) 

(B) 

(C) 

(D) 

Paragraph for Q. 3 to 4



(I) (II) (III) (IV)

3. Heterocyclic compound is – [3]

(A) I & II (B) II & III (C) III & IV (D) I, II, III & IV

4. Compound which is not amine – [3]

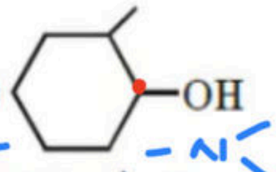
(A) I (B) II (C) III (D) IV

5. Classify the following alcohols as primary, secondary, or tertiary: [3]

(a) $(CH_3)_3CCH_2OH$ (b) $CH_3CH(OH)CH(CH_3)_2$

(c) $(CH_3)_2C(OH)CH_2CH_3$

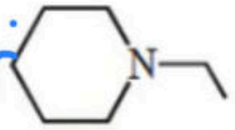
(d) 

(e) 

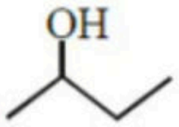
6. Classify the following amines as primary, secondary, or tertiary: [3]

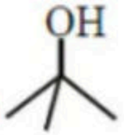
(a) $CH_3NHCH(CH_3)_2$ (b) $CH_3CH_2CH(CH_3)CH_2NH_2$

(c) $(CH_3CH_2)_3N$ (d) $(C_6H_5)_2CHCH_2NHCH_3$

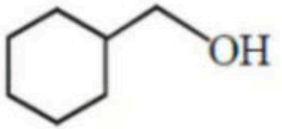
(e)  (f) 

7. Which of the following have both 2° alcohol & 2° carbon only . [3]

(A) 

(B) 

(C) 

(D) 

8. **Statement 1 :** If number of π bonds in the compound is 3 then its degree of unsaturation must be 3

Because [3]

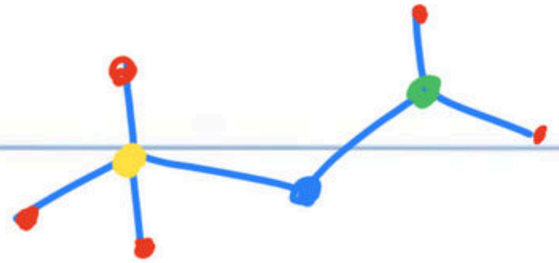
Statement 2 : For one π bond degree of unsaturation is equal to 1

(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

(C) Statement-1 is true, statement-2 is false.

(D) Statement-1 is false, statement-2 is true.



9. Isooctane contains **[3]**

(A) five (1° –C), one (2° –C), two(3° –C) atoms

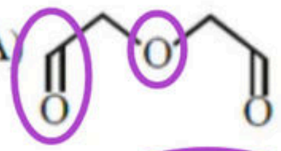
(B) four (1° –C), two (2° –C), one (3° –C) and one (4° –C) atoms

(C) four (1° –C), two (2° –C) and one (3° –C) atoms

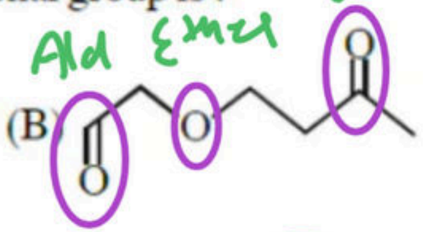
(D) five (1° –C), one (2° –C), one (3° –C) and one (4° –C) atoms

10. Compound having only three different functional group is : **[4]**

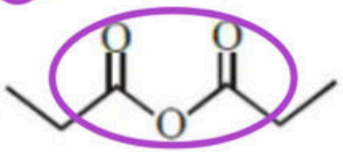
(A)



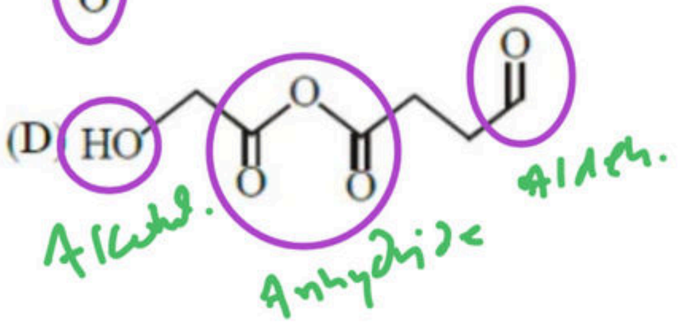
(B)



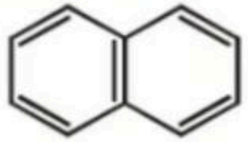
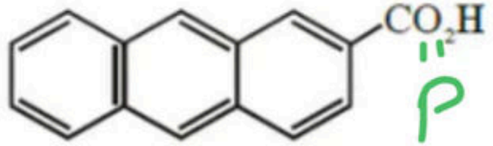
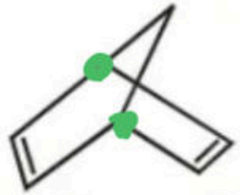
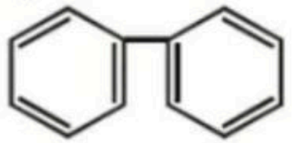
(C)



(D)



11. Match the column **[4]**

Column I (General formula)		**Column II**	
(A)		(P)	Index of hydrogen deficiency is odd
(B)		(Q)	Index of hydrogen deficiency is Even
(C)		(R)	Even number of 2° Carbon
(D)		(S)	Even number of 3° Carbon

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Kota (Raj.) 324005

DPP # 03

Time : 30 Min.

1. **Statement 1 :** Phenol is a heterocyclic compound. **[3]**

Statement 2 : In heterocyclic compound different atoms like O, N, S etc. are present in the ring.

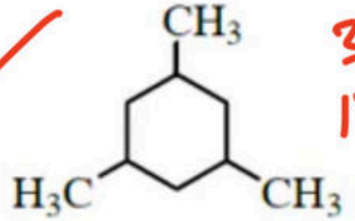
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

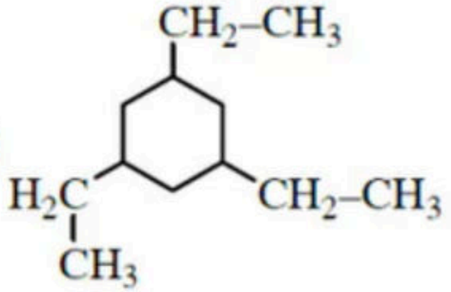
(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

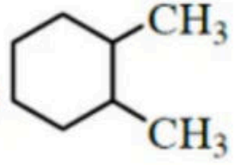
(C) Statement-1 is true, statement-2 is false.

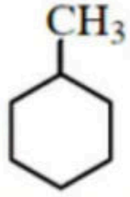
(D) Statement-1 is false, statement-2 is true.

2. In which compound 1°C : 2°C : 3°C (carbon) = 1 : 1 : 1.? **[3]**

(A) 

(B) 

(C) 

(D) 

3. All the members of homologous series have same :

(A) molecular mass

(B) functional group

(C) empirical formula

(D) general molecular formula

4. Compound having molecular formula $C_nH_{2n-4}O_3$ can have functional group.

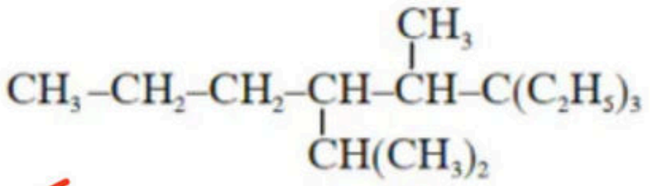
(A) 3-Aldehyde group

(B) 1-Carboxylic acid & 2-Aldehyde

(C) 1-Carboxylic acid anhydride & 1-alcohol

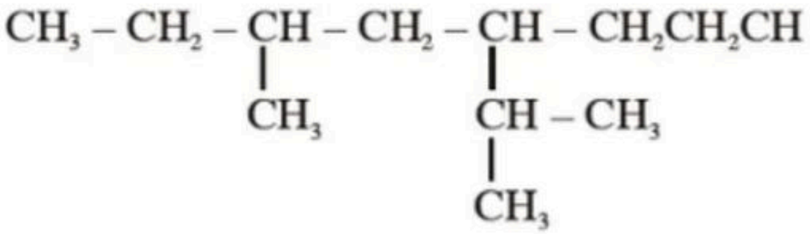
(D) 1-Carboxylic acid & 1-alcohol

5. The correct IUPAC name of the compound is : **[3]**

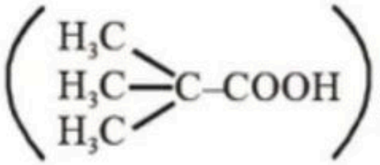


(A) 3,3-Diethyl-4-methyl 5-(1-methyl ethyl) octane
(B) 6,6-Diethyl-4-methyl-5-isopropyloctane
(C) 6,6-Diethyl-3-methyl 5-(1-methylethyl) octane
(D) 6,6-Diethyl-4-isopropyl-5-methyloctane

6. IUPAC name of the compound **[3]**



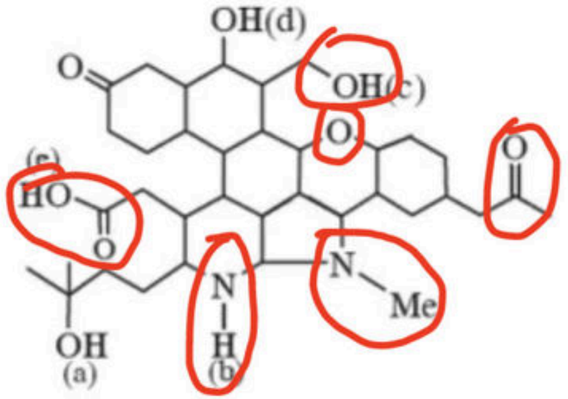
(A) 4-Isopropyl-6-methyloctane
(B) 3-Methyl-5-(1-methylethyl) octane
(C) 3-Methyl-5-isopropyloctane
(D) 6-Methyl-4-(1-methylethyl) octane

7. IUPAC name of pivalic acid  is : [3]

(A) Isobutylic acid
(B) 2-carboxy-2-methyl propane
(C) 2,2-dimethyl propanoic acid
(D) 2,2,2 trimethylethanoic acid

Paragraph for Question 08 and 09

Observe following compound and answer questions given below :



8. Total number of different types of functional gorups in this compound are **[3]**

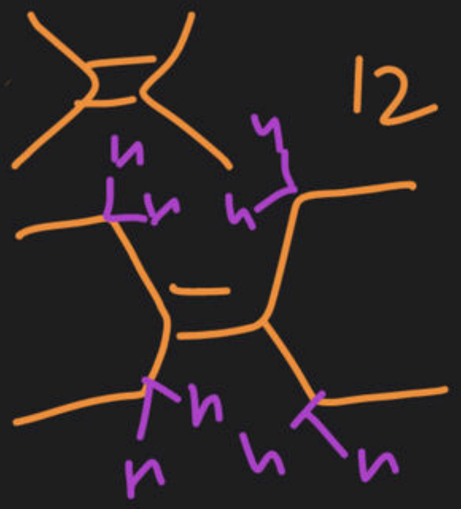
(A) 5 (B) 6 (C) 7 (D) 8

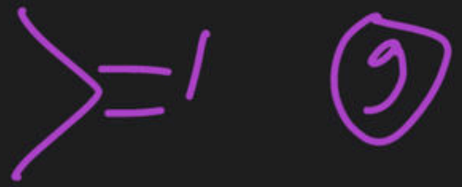
9. Degree of unsaturation of this compound is **[3]**

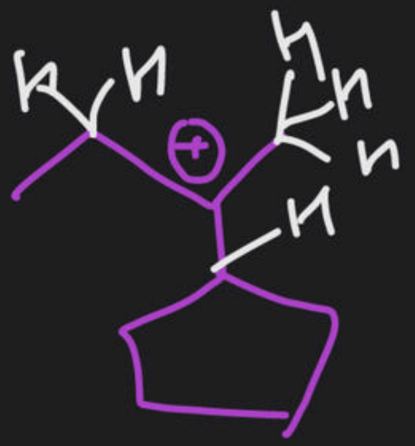
(A) 8 (B) 9 (C) 10 (D) 11

DPP ⇒ 4 & 5

Ex-3 :

(vi)  12

(vii)  (8)

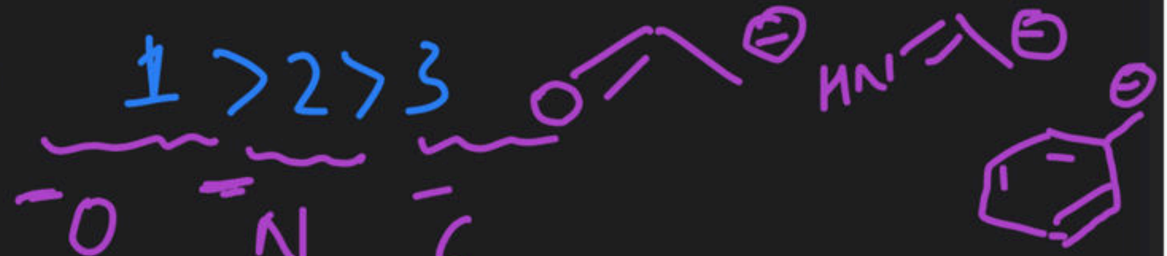
(viii)  (9)

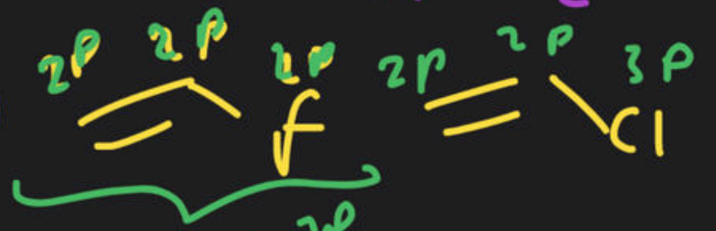
(6)

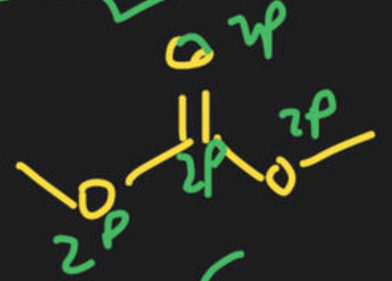
Ex :

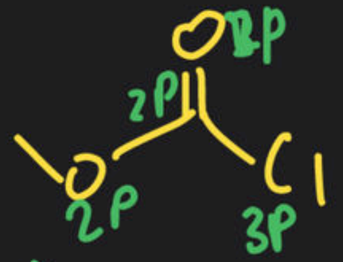
(3) 2 > 1

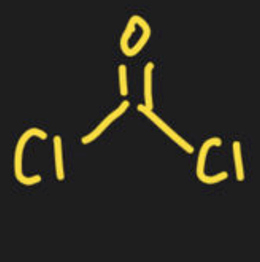
(4) 1 > 2 > 3



(5)  1 > 2

(6) 



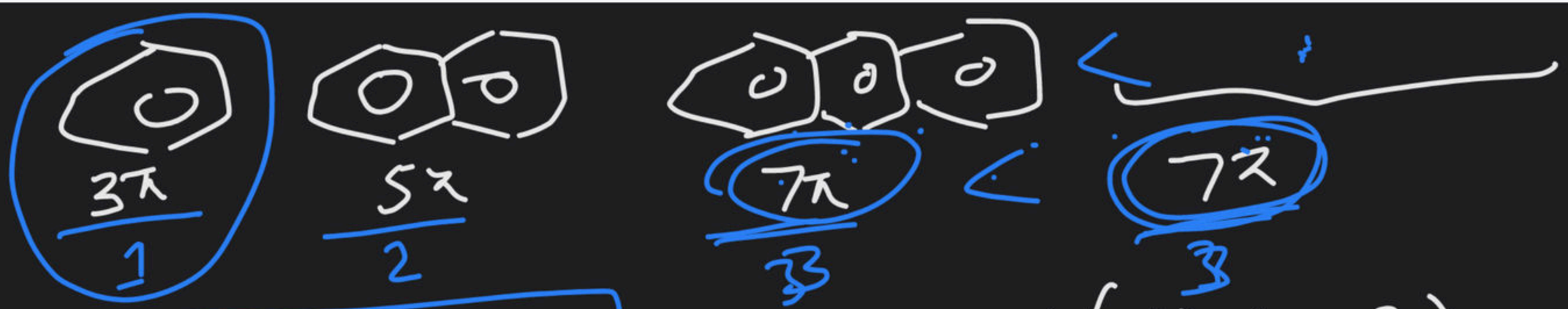


(1 > 2 > 3)

(7) 2 > 1

(8) 4 > 3 > 2 > 1

(9)



1 > 2 > 4 > 3

(10) 1 > 2 (SIR effect)

(11) 1 > 2 (Extended > Cross)

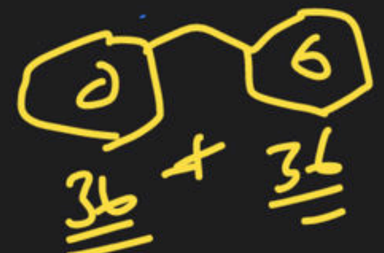
(12) 2 > 1 (E > Cross)

(13) 1 > 2 (E > Cross)

(14) (1 = 2)

(15)

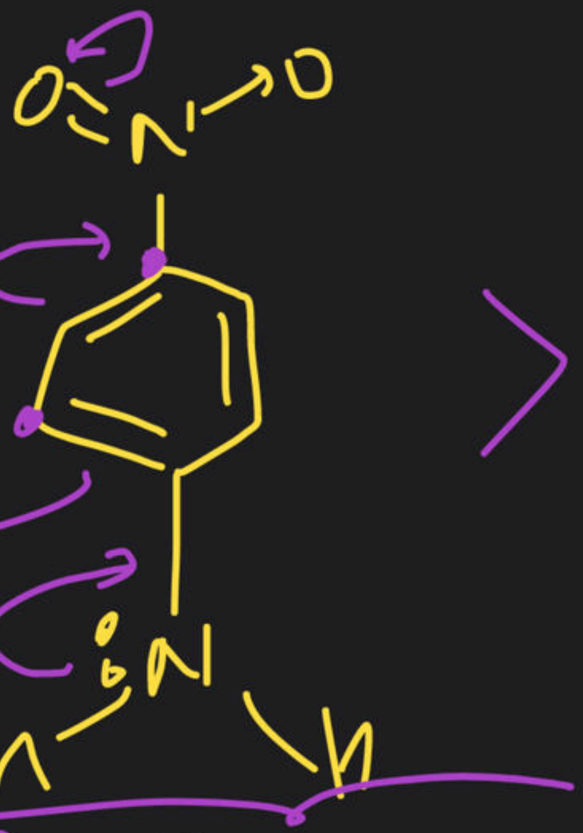
(16) 2 > 1

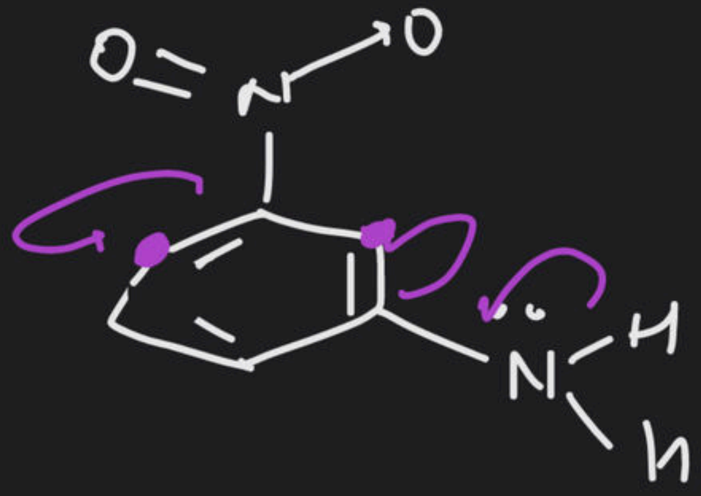


(17)

4 > 3 > 2 > 1

(21) 1 > 2





(6)

$\frac{27}{1}$ $\frac{55}{2}$ $\frac{51}{3}$

17273

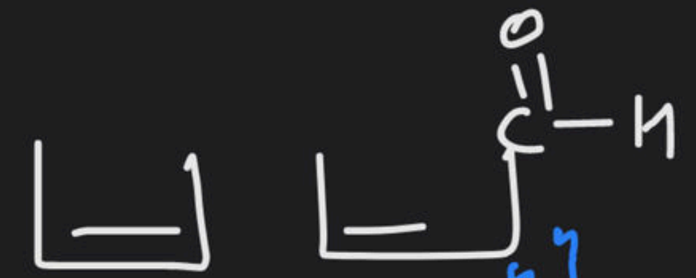
NOH

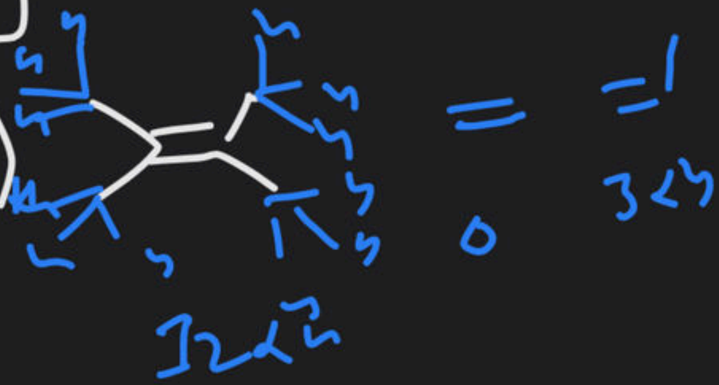
(3) 271

(4) 17372 ⇒ (1/stability)

(5) 27371

55 51 29





(7) 3 > 2 > 1

(8) 1 > 2 Resonance stabilized (1 / Stability)

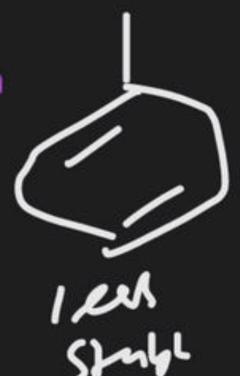
R > M > I

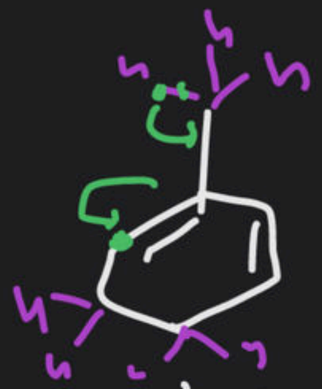
Dup (9)

less stable

Stable

less stable





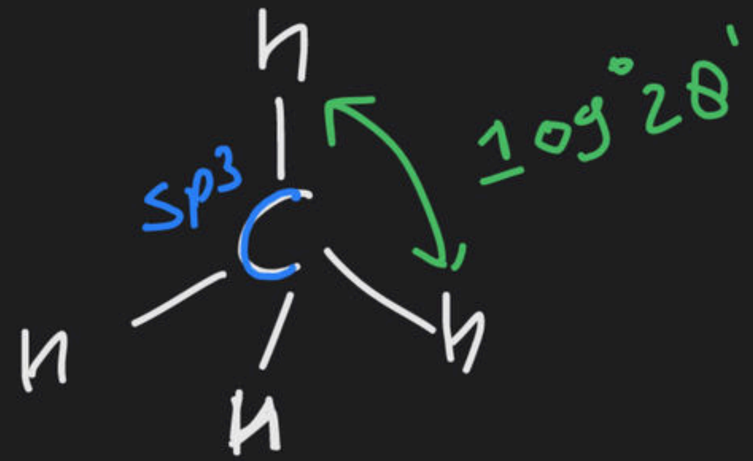
Stable

(1 / Stability)

(10) 2 > 1 (1 / Stability)

II > III > I

(#) Bayer's Strain Angle theory



For any sp^3 hybridised Carbon atom Bond angle must be 109°28' for maximum Stability

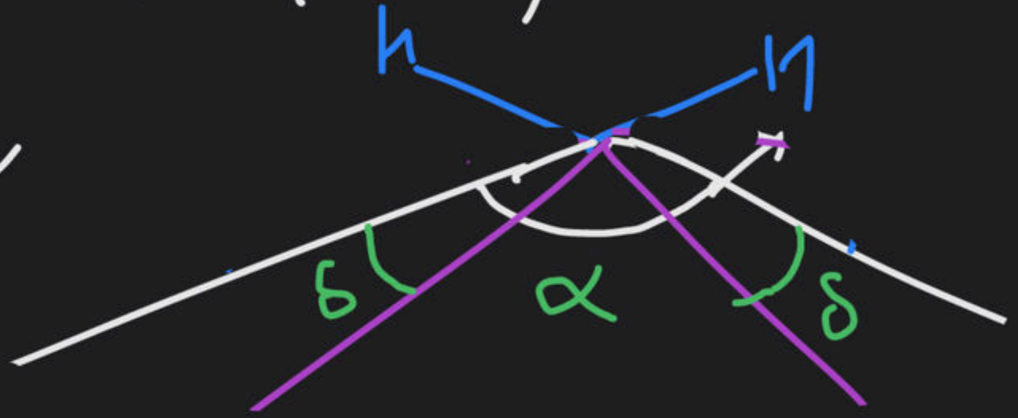
For following Cycloalkanes (it was believed till that Cycloalkanes are planes).

Acc. to Bayer:

⇒ All cyclo alkanes are strained & are not stable

⇒ Strain $\propto \frac{1}{\text{Stability}}$

⇒ Acc. to Bayer



$$\Rightarrow S+\alpha+\delta = 109^\circ 28'$$

$$\Rightarrow 2\delta+\alpha = 109^\circ 28'$$

$$\Rightarrow 2\delta = 109^\circ 28' - \alpha$$

$$\Rightarrow \delta = \frac{1}{2}\left[109^\circ 28' - \alpha\right]$$

Strain in Cycloalkenes :

$\alpha = 6.0^\circ \Rightarrow \delta = +24.5^\circ$

$\alpha = 9.0^\circ \Rightarrow \delta = +9.5^\circ$

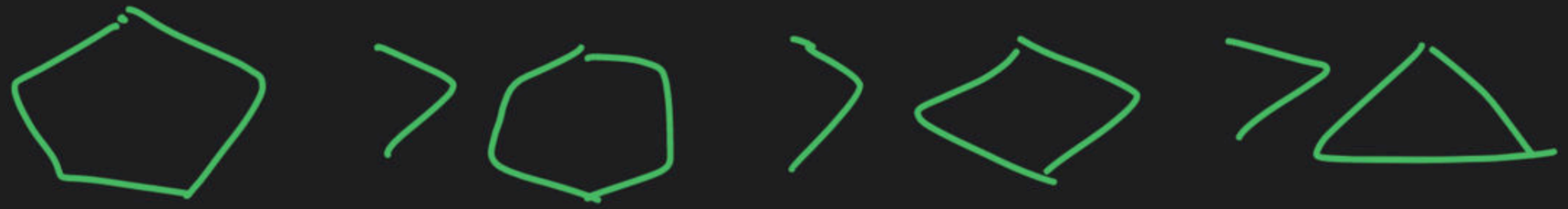
$\alpha = 10.8^\circ \Rightarrow \delta = 0.5^\circ$

$\alpha = 12.0^\circ \Rightarrow \delta = -5.5^\circ$

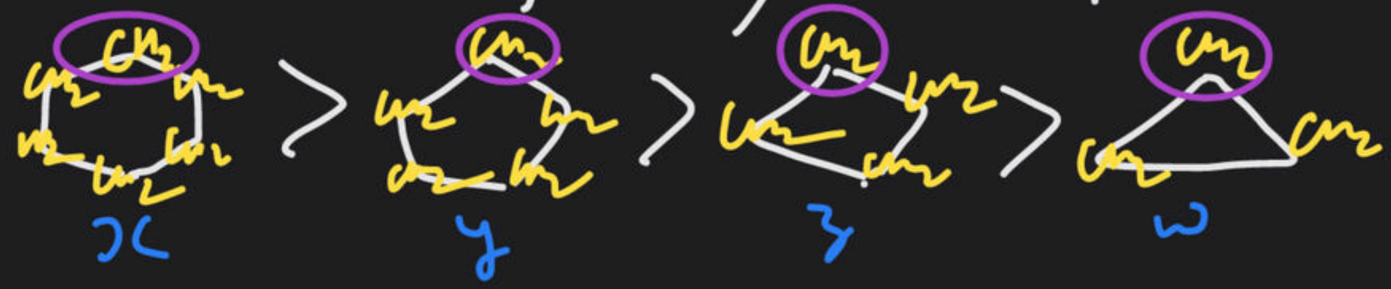
Acc. to Bayer's

(*) Strain order in cycloalkane

(*) Stability order



⇒ But HOC data for cycloalkanes is



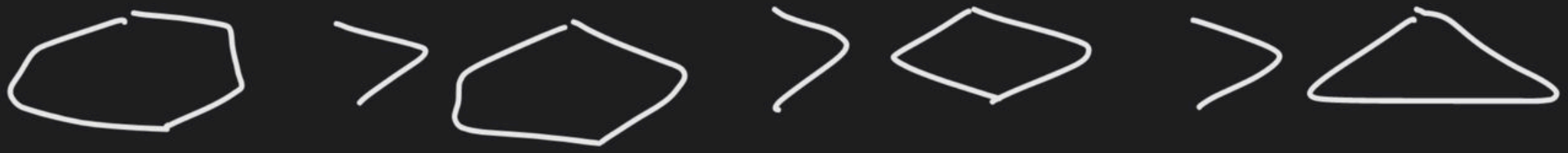
HOC per CH_2 for Cycloalkanes (Strain)

Arrival

0.50 kcal

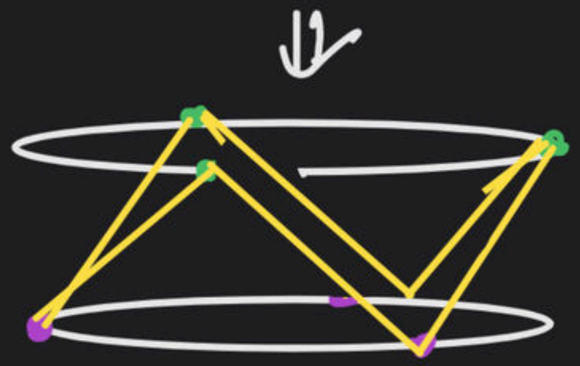
−5.5 kcal

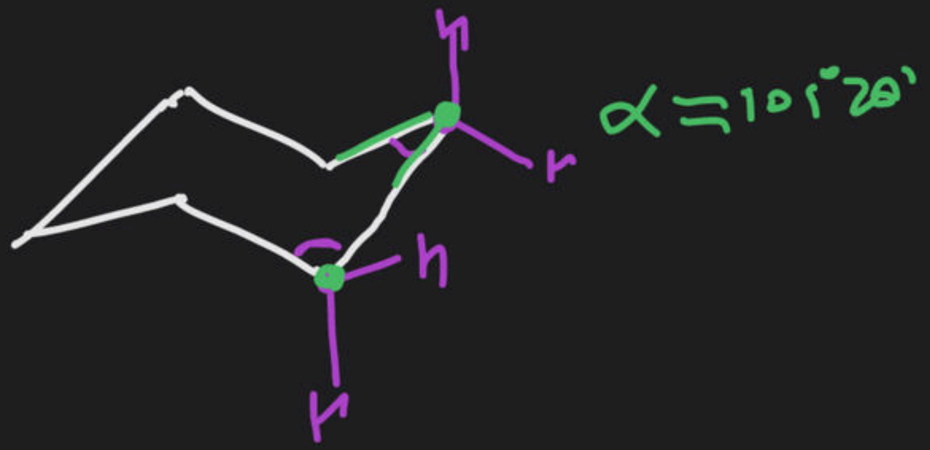
Stability order



It can be explain by understanding that cycloalkanes are not planar (except cyclopropane)

For Cyclohexane





(δ = 0)

(#) **Heat of Combustion** (HOC)

⇒ Enthalpy change when 1 mole of any compound is completely burnt/oxidised.

$$HOC \propto \text{No. of Carbon atom}$$

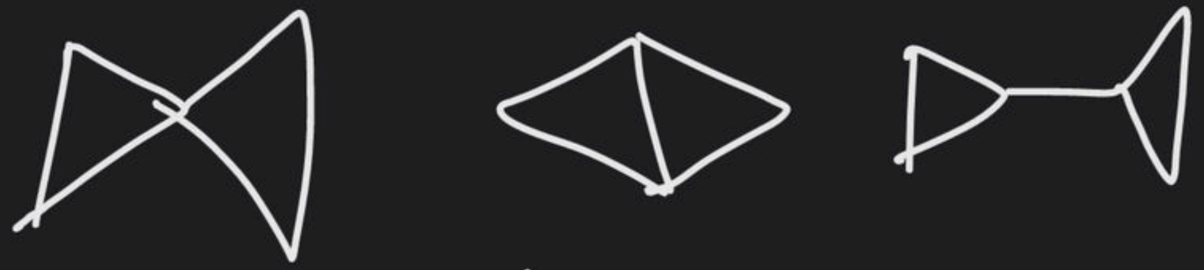
$$HOC/CH_2 \propto \frac{1}{\text{Stability}} \propto \text{Strain}$$

Note Actual stability order of compounds is decided by HOC.

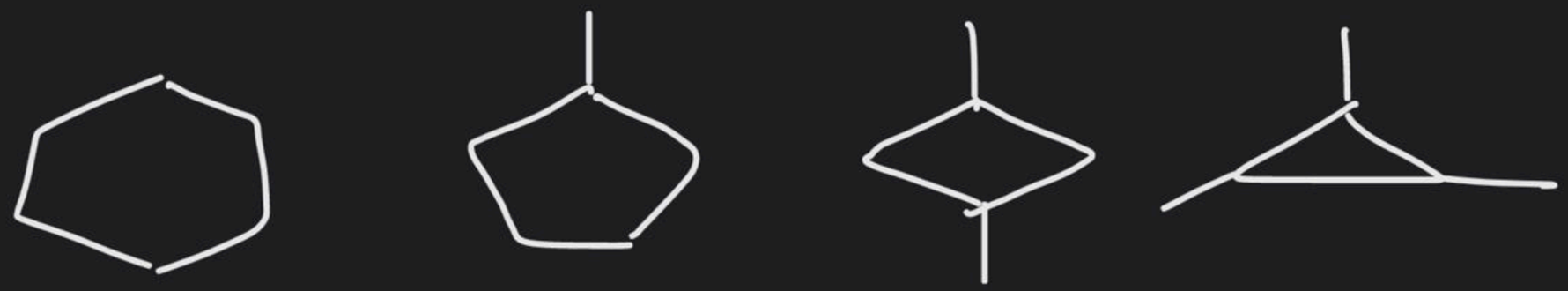
(1) 

(2) 2-methyl-3-Ethyl pentane , 2,2,3 Trimethyl Butane

(3) 

(4) 

(5) 

(6) 

(7) 

(8) - - - — — — — - — - - - per CH_2

(9) 

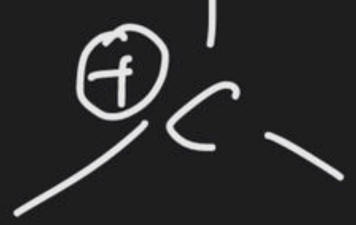
(10) ——————————— per CH_2

(1) Stability of intermidiates

(a) stability of Carbocation $\propto$ ED. groups

$\propto (+R > +H > +I)$

$\propto \frac{1}{-I > -H > -R}$



(b) Stability of Carbon free Radical $\propto$ ED. group

$\propto (+R > +H > +I)$

$\propto \frac{1}{-I}$

(c) stability of Carbanion $\propto$ EW. groups

$\propto (-R > -I)$

$\propto 1/(+I > +R)$