



THE IIT - JEE SECRET

JEE MAINS AND JEE ADVANCED

ORGANIC CHEMISTRY
VOL - I



Contents

1. Introduction to Organic Chemistry	1
2. IUPAC Nomenclature	18
3. ISOMERISM	63
4. General Organic Chemistry	191

INTRODUCTION TO ORGANIC CHEMISTRY

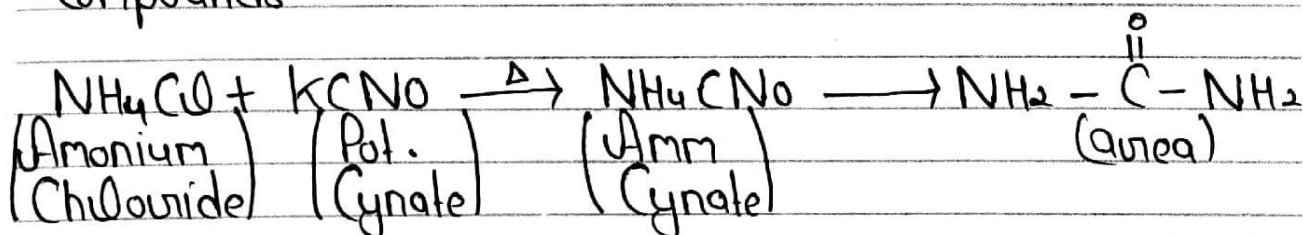
Old Definition =

According to Berzelius, organic compounds were those compounds which can only be found in living organisms. They cannot be prepared in the lab by using organic compounds.

Vital Force Theory =

According to Berzelius, there is a mysterious force (god given) that is present only in living organisms and is responsible for the formation of organic compounds.

Wohler = He discarded this theory by preparing urea (a part of living organism) using inorganic compounds.

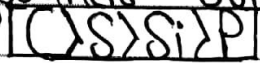


New Definition = Organic compounds are those compounds which contain carbon, hydrogen, and their derivatives (O, X, S, N, P) etc.

Reason for large No. of OC Special Properties of Carbon

(1) Catenation =

It is a Property of Self Linkage and forming long Chain Compounds, order of Catenation.



(2) Tetravalency =

It Means an atom having four Valency i.e. it can form 4 Bonds at a time.

(3) Tendency to form Multiple Bonds =

Carbon can form single Bond, double Bond, or triple Bond at a time which give rise to varied number and type of OC

(4) Size and EN of Carbon = Carbon atom has appropriate Size of Moderate EN, which is one of the Major factor for Stability of its Compound

(5) Isomerism = Two or More Compounds having different Physical or chemical Properties But But By Chance If their Molecular Formulas are same, these are known as isomerism of each other and the phenomenon is known as Isomerism.

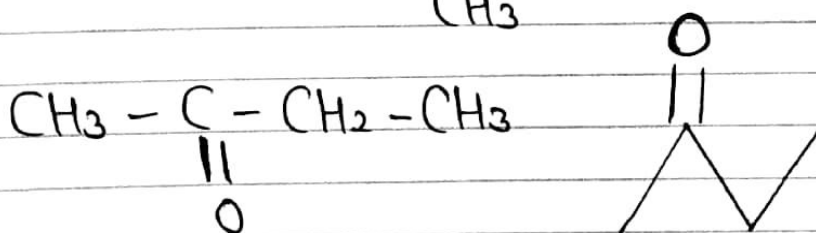
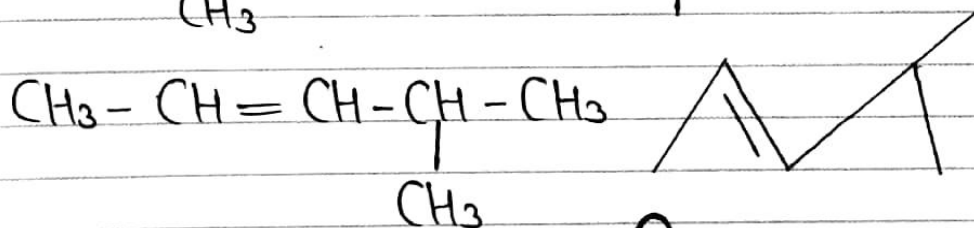
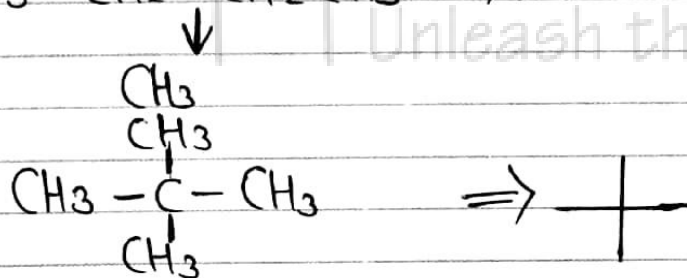
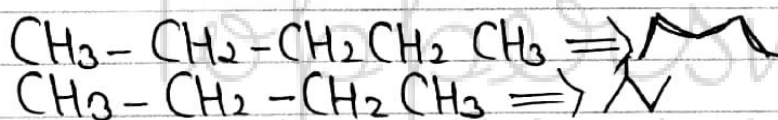
Representation of OC

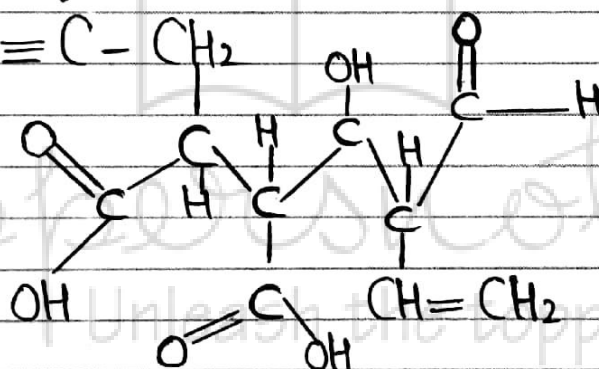
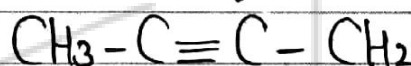
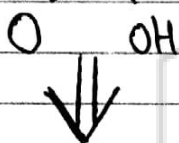
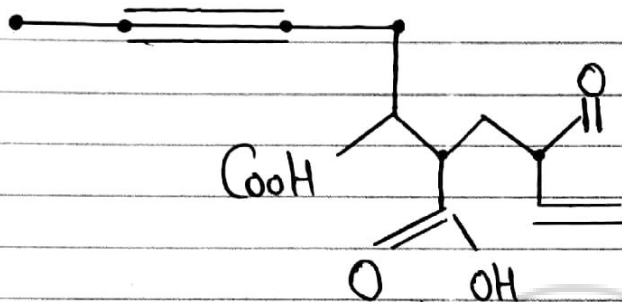
2-0

3-0

- = Molecular Formula
- = Structural Formula
- = Complete Structural Formula
- = Bond line notation

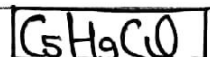
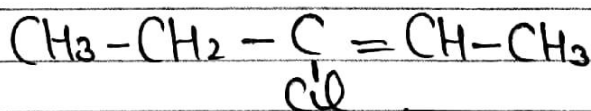
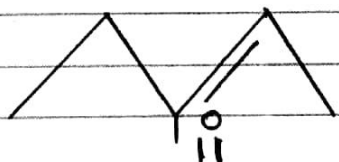
Egs



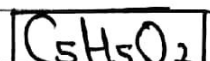
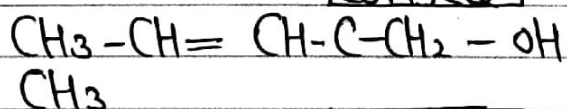


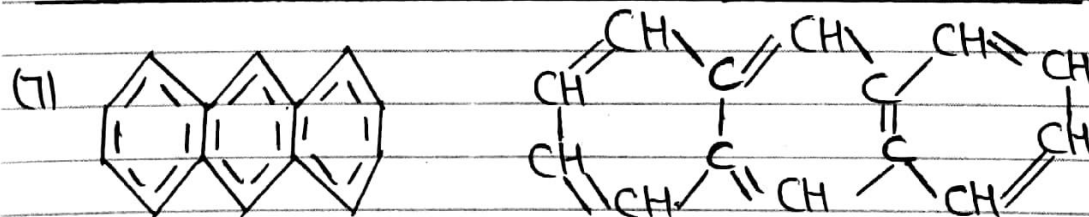
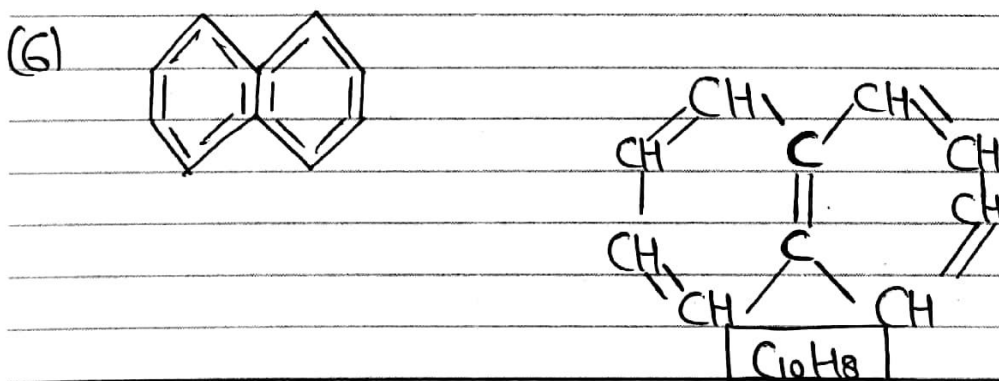
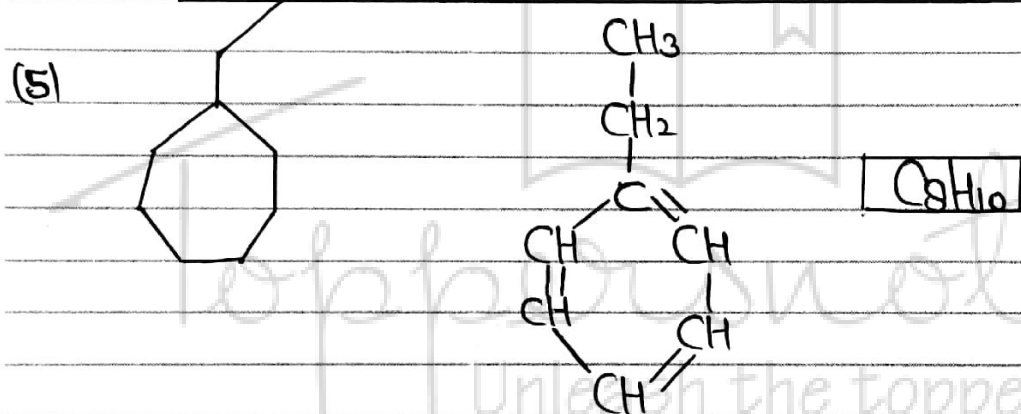
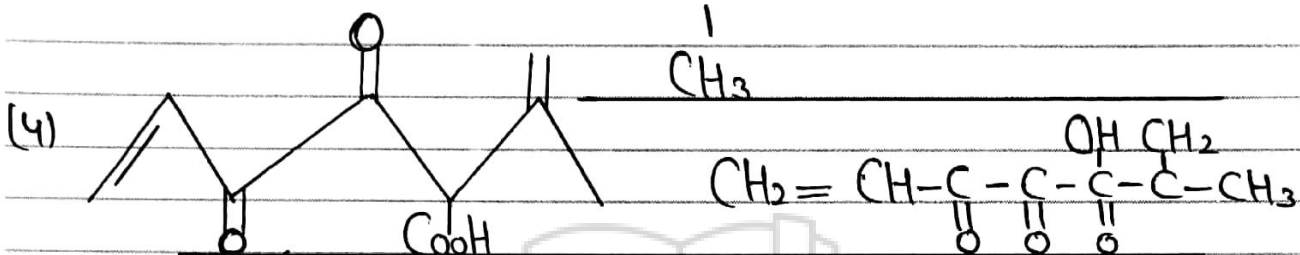
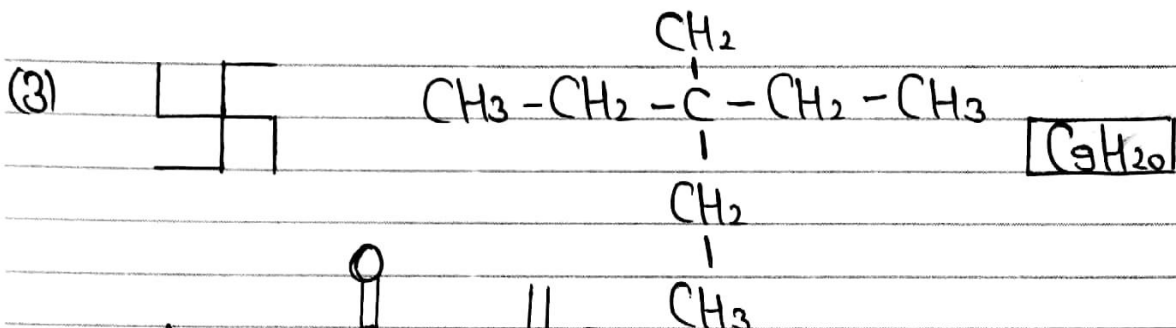
Q - Write the Structural formula of the and Molecule formed following Compounds.

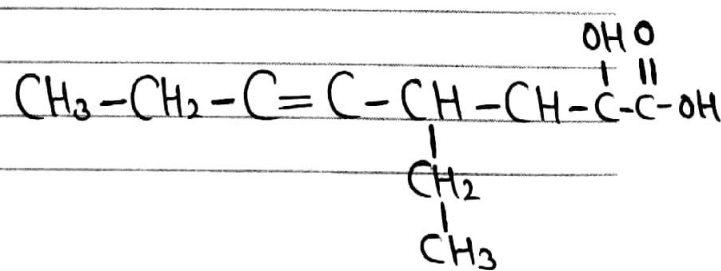
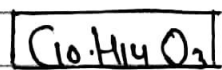
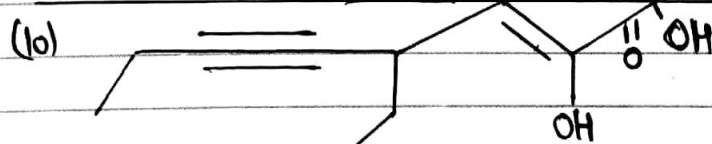
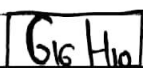
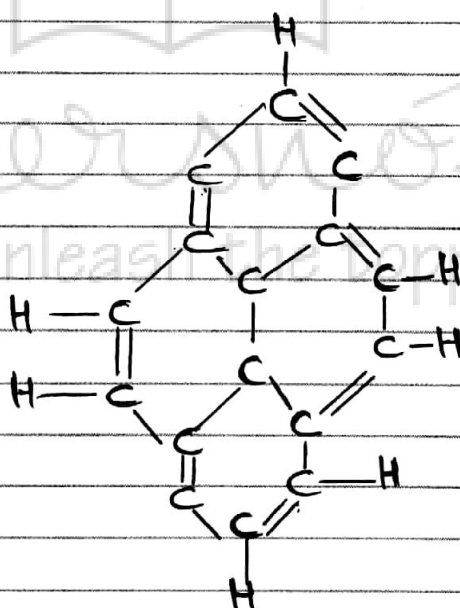
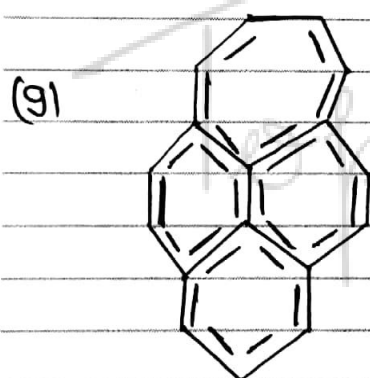
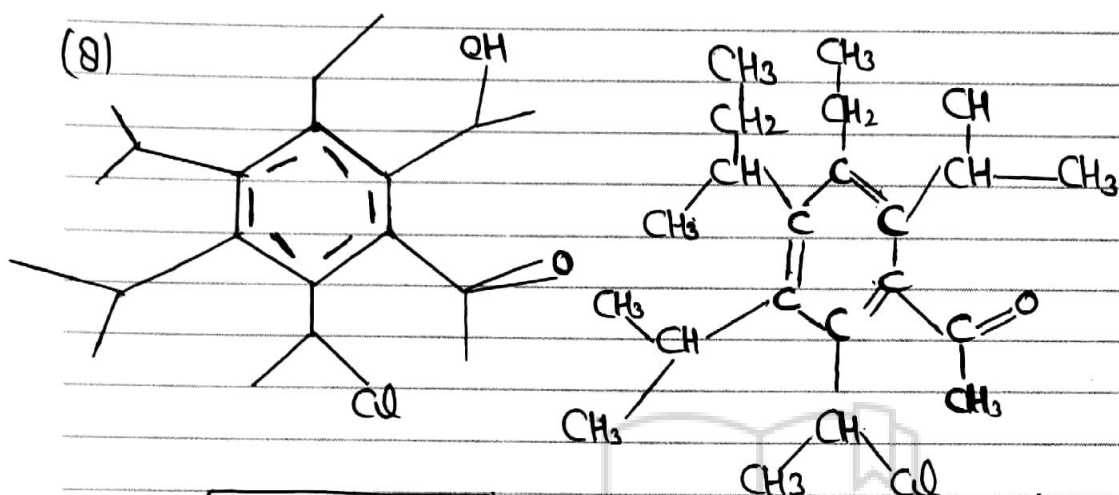
(1)



(2)





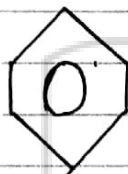


Degree of Unsaturation and Double Bond Equivalent Index of - H - Deficiency / Compound Index

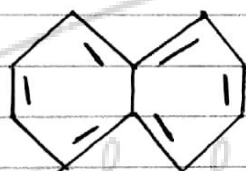
Double Bond = Number of π Bonds + Number of enclosed Structures (no. of - rings)

Eg =

Benzene



Double = 4



Double = 7

Note : Many of the Compound $C=C$ is known as olefinic Bond and $C\equiv C$ is known as acetylenic Bond.

$\Rightarrow$ olefins $\Rightarrow$ name given to alkenes due to their affinity towards oil.

acetylenic $\Rightarrow$ is common name of Ethynes.

Paraffins $\Rightarrow$ alkanes having lesser affinity.

Note : α, β, γ Classification

System - C - C - C - C
 $\alpha \quad \beta \quad \gamma \quad \delta$

The H attached to these Carbon are named according to

these Carbon

1°, 2°, 3° Classification $\Rightarrow$ The atom which is otherwise attached one C-atom only is known as 1-Carbon and the H-attached to it is known as 1-Hydrogen

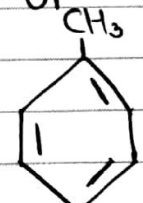
2° or Secondary C-atom $\Rightarrow$ The C-atom which is otherwise attached to two C-atoms only is known as 2-C and the attached to it is known as 2-H

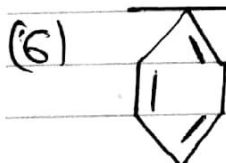
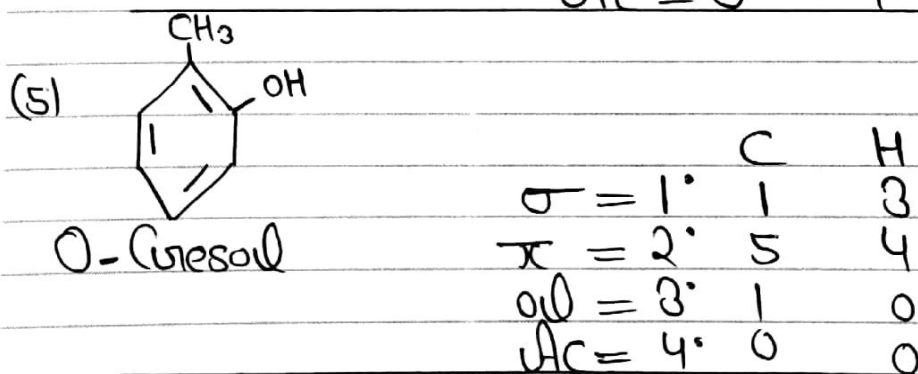
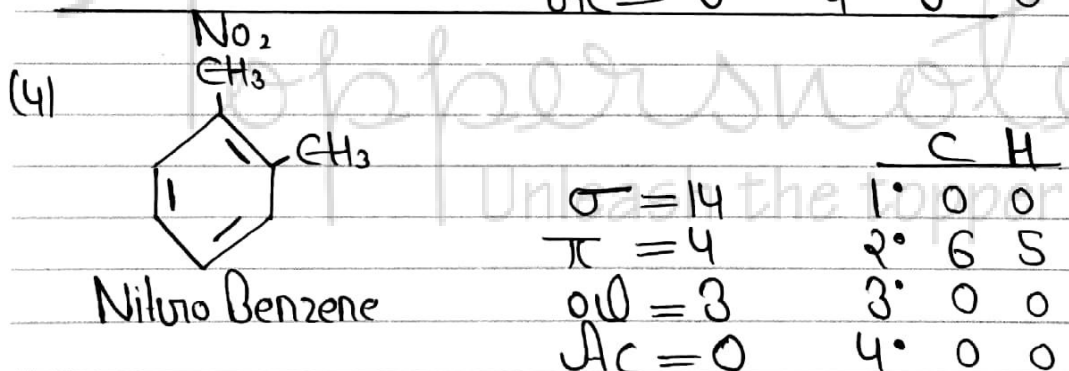
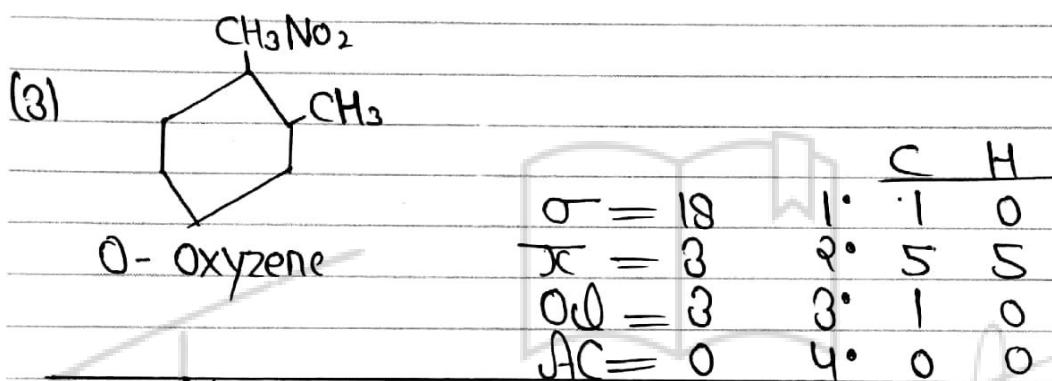
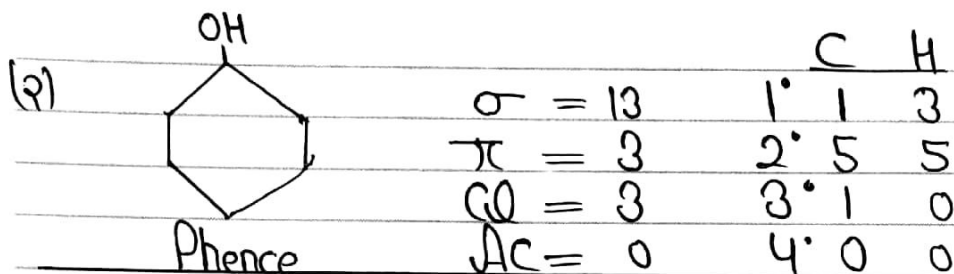
3° or Tertiary C $\Rightarrow$ The Carbon-atom which is otherwise attached to 3 C-atoms only is known as 3-C and the H attached to it is known as 4°H

4° or Quaternary C $\Rightarrow$ The Carbon-atom which is attached to 4 C-atoms which is known as 4°C. There is no H-atom as Valency of C is satisfied

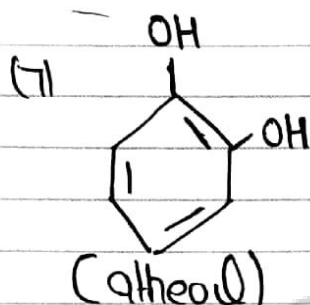
Note: In ammonia derivatives (animes) the degree of Compound is however according to the number of C-atoms directly attached to Nitrogen (N)

Q-1 In the following Compounds Determine the no-of-Bonds, no-of-olefinic and acetylenic Bonds - no-of-1.2.3.4. C & H-and DBE

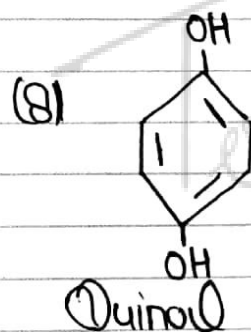
(II)			C		H	
			1°	2°	3°	4°
	$\sigma = 15$		5	1	5	0
	$\pi = 3$		0	1	0	0
	$\text{Al} = 3$		0	0	0	0
	$\text{Alce} = 0$		0	0	0	0



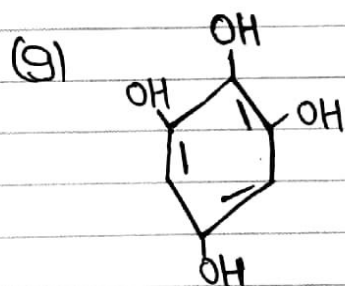
	C	H
$\sigma = 14$	1° 0	0
$\pi = 3$	2° 6	4
$OD = 3$	3° 0	0
$Ac = 0$	4° 0	0



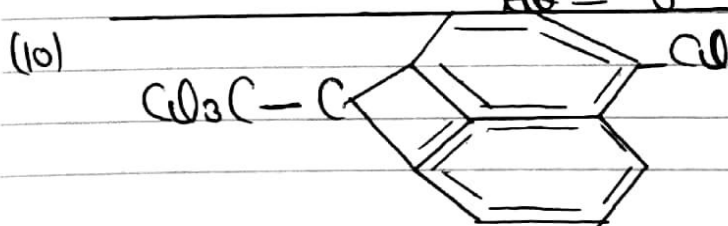
	C	H
$\sigma = 14$	1° 0	0
$\pi = 3$	2° 6	4
$OD = 3$	3° 0	0
$Ac = 0$	4° 0	0



	C	H
$\sigma = 14$	1° 0	0
$\pi = 3$	2° 6	4
$OD = 3$	3° 0	0
$Ac = 0$	4° 0	0



	C	H
$\sigma = 15$	1° 0	0
$\pi = 3$	2° 6	3
$OD = 3$	3° 0	0
$Ac = 0$	4° 0	0

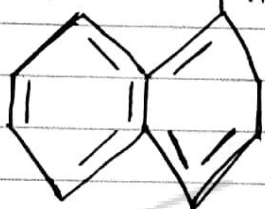


		C	H
$\sigma = 09$	1°	1	0
$\pi = 6$	2°	10	8
$ou = 6$	3°	3	1
$AC = 0$	4°	0	0

DDT (Dichloro, Diphenyl, Trichloro ethane)

Double = 8

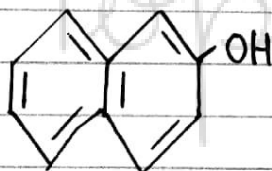
(11)



1-Naphthol

		C	H
$\sigma = 20$	1°	0	0
$\pi = 5$	2°	8	7
$ou = 5$	3°	2	0
$AC = 0$	4°	0	0

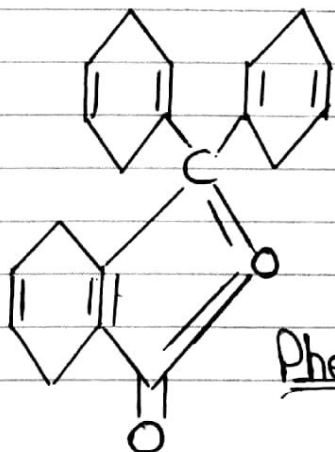
(12)



1-Naphthol

		C	H
$\sigma =$	1°	0	0
$\pi =$	2°	8	7
$ou =$	3°	2	0
$AC =$	4°	0	0

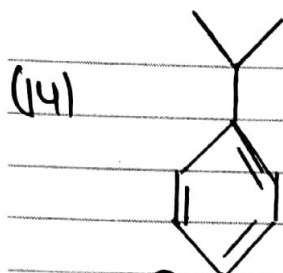
(13)



Phenolphthalein

		C	H
$\sigma = 41$	1°	0	0
$\pi = 10$	2°	15	12
$ou = 9$	3°	3	0
$AC = 0$	4°	1	0

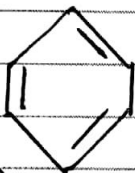
Double = 14



Cumene

$\sigma = 11$	1°	2	6
$\pi = 3$	2°	5	5
$o\omega = 3$	3°	2	1
$AC = 0$	4°	0	0

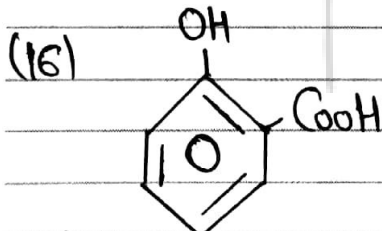
(15)



Pyridine

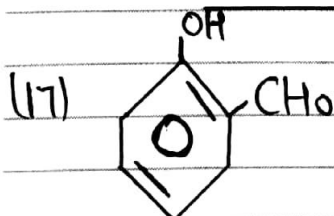
$\sigma = 11$	1°	2	2
$\pi = 3$	2°	3	3
$o\omega = 2$	3°	0	0
$AC = 0$	4°	0	0

Doubles = 4



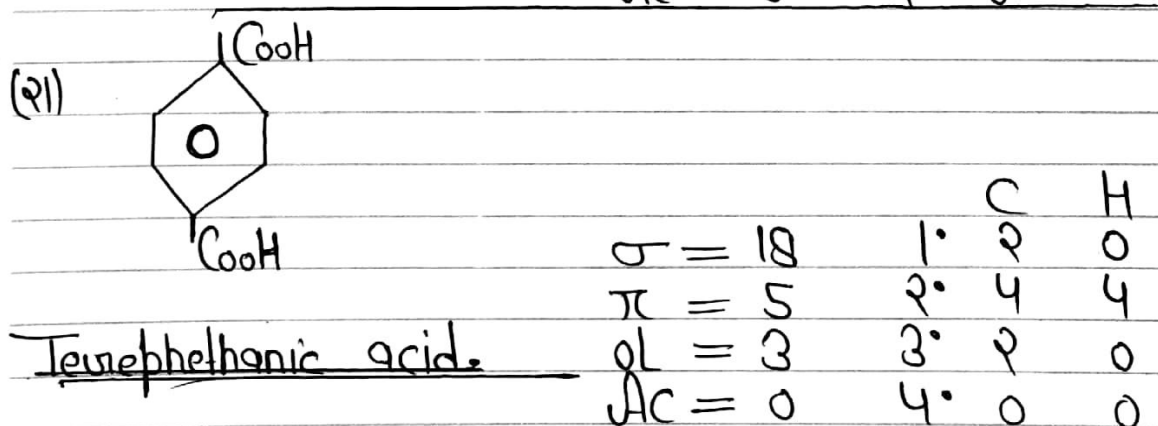
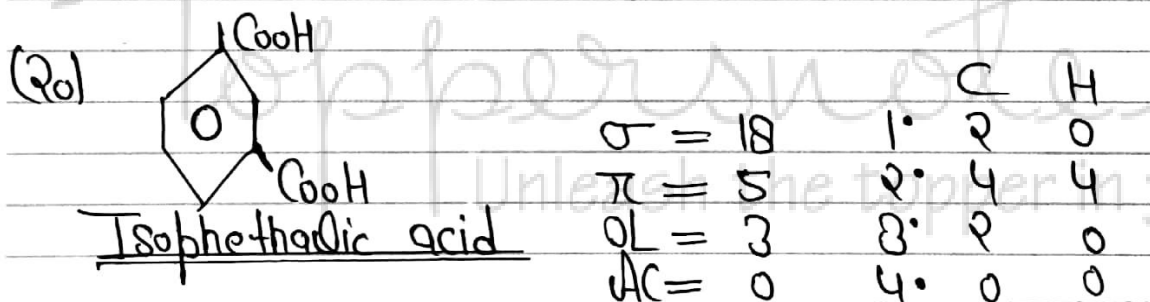
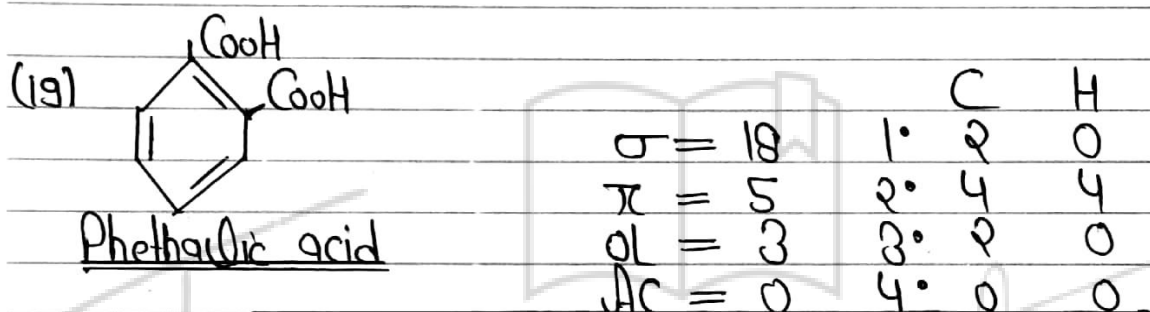
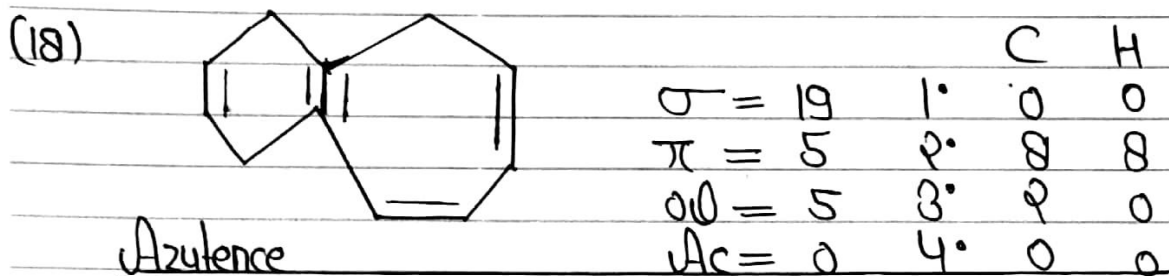
Salicylic acid

$\sigma = 16$	1°	1	0
$\pi = 4$	2°	5	4
$o\omega = 3$	3°	1	0
$AC = 0$	4°	0	0



Salicylaldehyde

$\sigma = 11$	1°	1	0
$\pi = 3$	2°	5	4
$o\omega = 3$	3°	1	0
$AC = 0$	4°	0	0



Homologous Series / Homolous

Series of Chemical Compound Belonging to Same family and having same general Molecular formula is known as homologous series.

- (1) Members of homologous series are known as Homologs.
- (2) Each Members has similar Method of Preparation and similar Chemical Properties But their Physical Properties show regular graduation.
- (3) Each Homologue can be represented by a general Chemical formula.
 - Alkane - $C_n H_{2n+2}$
 - Alkene - $C_n H_{2n}$
 - Alkyne - $C_n H_{2n-2}$

(4) Successive Member of Each Homologous Series shows a difference of (CH_2) or 14 Molecular Mass

(5) Members Belonging to Same Homologous Series must have same functional group.

Classification Based on Structure