

BP 202T - PHARMACEUTICAL ORGANIC CHEMISTRY - I**UNIT: 1 CLASSIFICATION, NOMENCLATURE & ISOMERISM****CLASS: 1****TOPIC: CLASSIFICATION OF ORGANIC COMPOUNDS**

Organic chemistry is defined as the study of carbon compounds.

Or

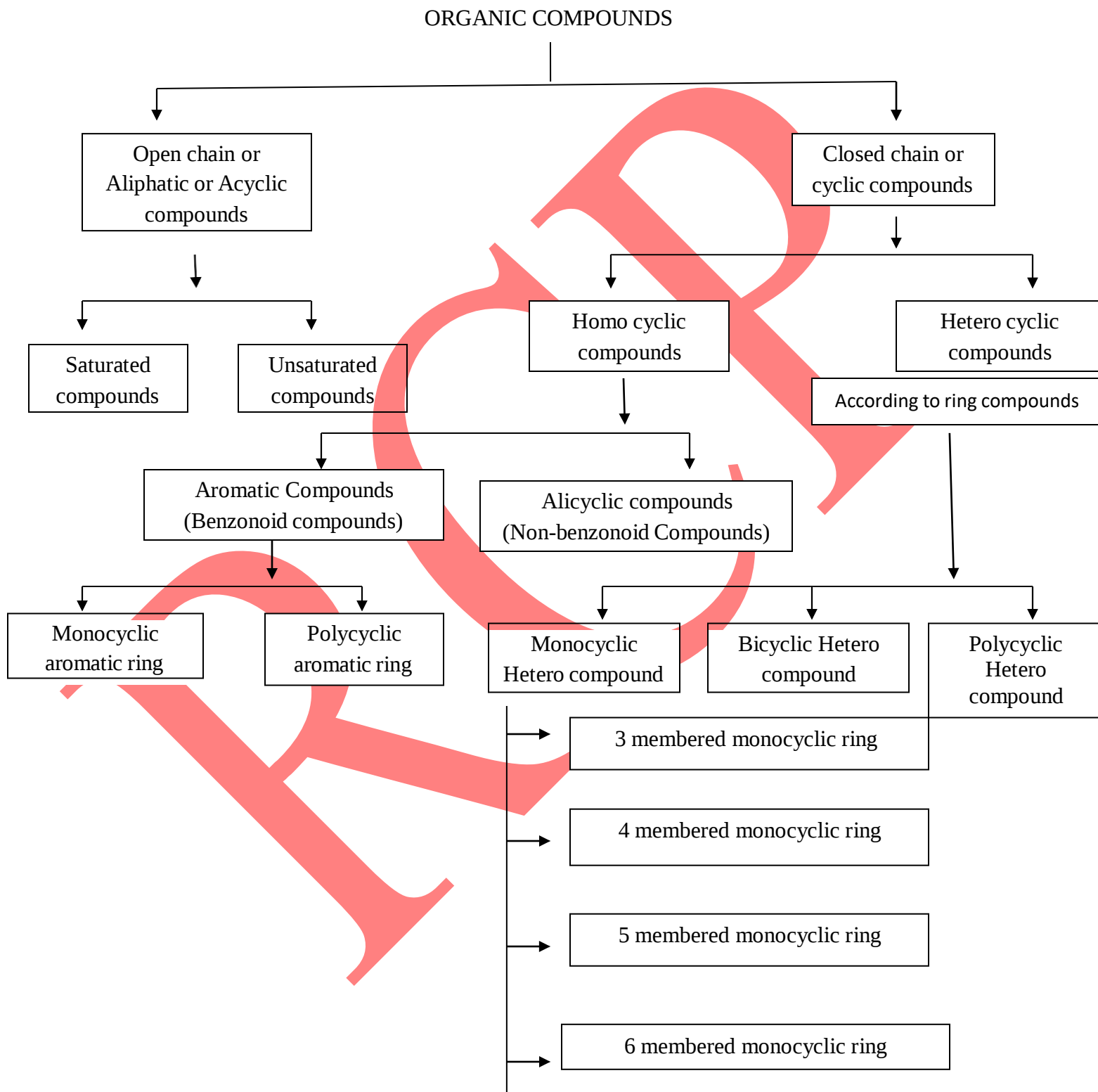
Organic chemistry is a branch of chemistry that deals with the structure, properties and reactions of compounds that contains carbon.

All organic compounds contain the element carbon. Most of them also contain hydrogen. Many organic compounds also contains elements O, N, S, P, and Halogens

Examples: Carbon monoxide (CO), carbon dioxide (CO₂), Carbonates (Na₂CO₃), Thiocyanates (NaSCN), Carbides (CaC₂), Carbon disulfides (CS₂), cyanides (KCN)

S.No	Organic Compounds	Inorganic Compounds
1	Low melting points	High melting points
2	Low boiling points	High boiling points
3	Low solubility in water, high solubility in non-polar solvents	High solubility in water, low solubility in non-polar solvents
4	Flammable	Non-flammable
5	Solutions are non-conductors of electricity	Solutions are conductors of electricity
6	Exhibit covalent bonding	Exhibits ionic bonding
7	Exhibits isomerism	Isomers are limited to few a few exceptions (eg: the transition elements)
8	Chemical reactions are usually low	Chemical reactions are fast

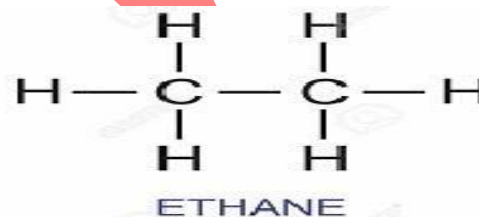
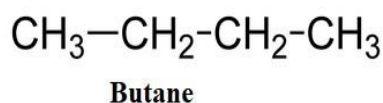
The compounds in solid, liquid or gaseous state having carbon in its molecule are known as organic compounds. All the living organisms are based on organic compounds. In organic compounds one or more atoms of carbon are covalently linked to atoms of other elements, most commonly hydrogen, oxygen or nitrogen.

CLASSIFICATION OF ORGANIC COMPOUNDS

1. **Open Chain Compounds Or Aliphatic Or Acyclic Compounds:** these are the compounds in which carbon atoms are linked to each other in linear manner (aliphatic) or branched manner (acyclic) in such a way that the molecule is having open chain structure.

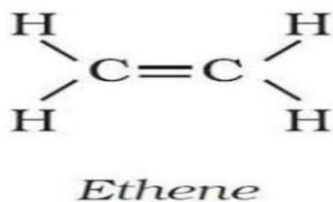
i) **Saturated open chain compounds:** These compounds contain carbon – carbon single bond

Examples:



ii) **Unsaturated open chain compounds:** These compounds contain carbon – carbon double or triple bond.

Examples:



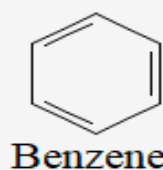
2. **Closed Chain Or Cyclic Compounds:** These are the compounds which have closed chain of carbon atoms

I. **Homocyclic compounds:** These are the compounds in which the ring structure is made up of only carbon atoms.

(A) **Aromatic compounds or benzenoid compounds:** These compounds contain one or more benzene ring in their structure. The word aromatic is obtained from a Greek word “Aroma” means “Sweet Smell”. Most of these compounds have a pleasant odor.

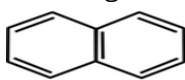
(i) **Monocyclic aromatic ring:** These compounds contain only one single aromatic ring or benzene ring.

Example:

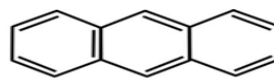


(ii) **Polycyclic aromatic ring:** These compounds contain two or more aromatic or benzenoid rings fused together.

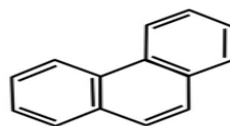
Examples:



naphthalene



anthracene



phenanthrene

(B) **Alicyclic compounds or Non-Benzenoid compounds:** These are the cyclic compounds with ring structure containing only carbon atoms are called alicyclic compounds. Though these compounds possess ring structure they behave more like aliphatic compounds either saturated or unsaturated.

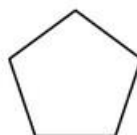
Examples:



Cyclopropane



Cyclobutane



Cyclopentane



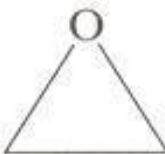
Cyclohexane

II. **Hetero cyclic compounds:** These are the cyclic compounds in which they contain carbon and hetero atoms like N, O, S etc., along with the carbon and hydrogen atoms are called as heterocyclic compounds.

(A) **Monocyclic hetero cyclic ring:** These compounds contain only one ring structure

(i) **3 membered ring structure:** These cyclic rings have two carbon atoms and one hetero atom.

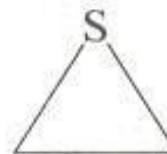
Examples:



ethylene oxide
oxirane



ethyleneimine
aziridine



ethylene sulfide
thiirane

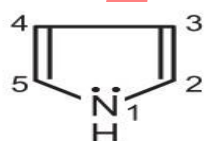
- (ii) **4 membered ring structure:** These cyclic ring contains 3 carbon atoms and 1 hetero atom.

Examples:

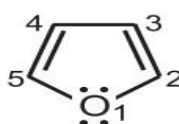
	Azetidine	Oxetane	Thietane	Azete	Oxete	Thiete
4-Atom Ring						

- (iii) **5 membered ring structure:** These cyclic ring contains 4 carbon atoms and 1 hetero atom.

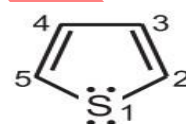
Examples:



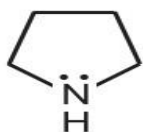
Pyrrole



Furan



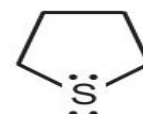
Thiophene



Pyrrolidine



Tetrahydrofuran (THF)



Thiolane

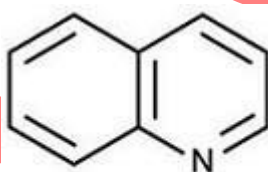
- (iv) **6 membered ring structure:** These cyclic ring contains 5 carbon atoms and 1 hetero atom.

Six membered ring; one hetero-atom					
Hetero-atom	Saturated		unsaturated		
Nitrogen	Piperidine		Pyridine		
Oxygen	Tetrahydropyran		Pyrilium		
Sulphur	Thiane		Thiopyran		

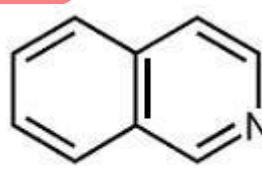


	Saturated			Unsaturated		
Heteroatom	Nitrogen	Oxygen	Sulphur	Nitrogen	Oxygen	Sulphur
Three-membered Heterocyclic Compounds	 Aziridine	 Oxirane	 Thiirane	 Azirine	 Azirine	 Thiirene
Four-membered Heterocyclic Compounds	 Azetidine	 Oxetane	 Thietane	 Azete	 Oxete	 Thiete
Five-membered Heterocyclic Compounds	 Pyrrolidine	 Oxolane	 Thiolane	 Pyrrole	 Furan	 Thiophene
Six-membered Heterocyclic Compounds	 Piperidine	 Oxane	 Thiane	 Pyridine	 Pyran	 Thiopyran

(B) Bicyclic heterocyclic ring: These compounds consist of two ring structures in which at least one ring is having a heteroatom. i.e., two rings are fused with each other.



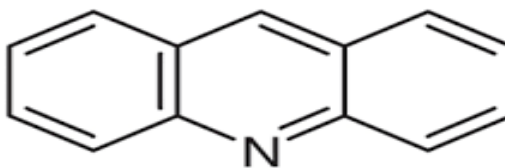
Quinoline



Isoquinoline

(C) Polycyclic heterocyclic ring: These rings are having more than two ring systems in which at least one ring is having a heteroatom. i.e., more than two rings are fused to each other.

Example:



Acridine

5 MARKS QUESTIONS

1. What is organic chemistry? Classify the organic compounds with suitable examples?

2 MARKS QUESTIONS

1. Write the classification of organic compounds