

Difference Between Alicyclic and Aromatic Compounds

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Key Difference - Alicyclic vs Aromatic Compounds

Based on the nature of the carbon skeleton, [organic compounds](#) are broadly classified into four categories namely, a) [aliphatic](#) b) alicyclic, c) aromatic, and d) [heterocyclic compounds](#). Aliphatic compounds have single or multiple carbon bonds but do not have cyclic structures. Alicyclic compounds are formed by joining two carbon atoms of an aliphatic chain through a [covalent bond](#) resulting in a cyclic structure. Aromatic compounds are also cyclic, but the bonds are delocalized. Heterocyclic compounds can be either alicyclic or aromatic, but the ring contains one or more hetero atoms. This article focuses on the difference between alicyclic and aromatic compounds. The **key difference** between alicyclic and aromatic compounds is that the **alicyclic compounds are cyclic compounds but resemble the aliphatic compounds in their properties, whereas aromatic compounds have conjugated rings and show aromaticity as the main property**. In addition, there are many differences that exist between these two group of compounds, and they are discussed below.

What are Alicyclic Compounds?

Alicyclic compounds are the organic compounds containing closed rings of carbon atoms. These compounds are formed by joining two carbon atoms of an aliphatic chain through a covalent bond. Hence, the properties of alicyclic compounds are similar to the properties of aliphatic compounds.

Alicyclic compounds are also known as cycloaliphatic compounds. These compounds may be [saturated or unsaturated](#). Due to ringed-structure, aliphatic compounds show stereochemical properties. These properties are however absent in aliphatic compounds.

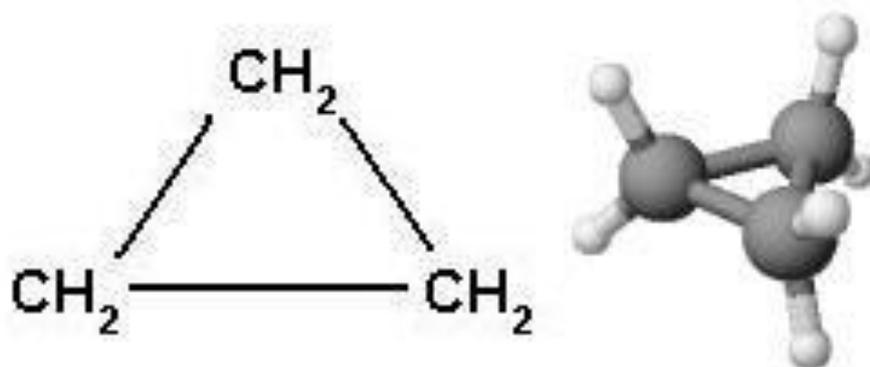


Figure 01: Cyclopropane

Some important natural compounds such as steroids, terpenoids, and many alkaloids contain alicyclic compounds. Cyclopropane and cyclohexane are the simplest alicyclic compounds.

What are Aromatic Compounds?

Aromatic compounds are the organic compounds with conjugated rings. Double and single bonds are alternatively arranged to form the cyclic structure. [Benzene](#) is the simplest aromatic compound of the chemical formula of C_6H_6 . Because of the delocalized bonds and conjugated ringed-structure, aromatic compounds exhibit properties (aromaticity) that are different from aliphatic and alicyclic compounds.

There are certain important characteristics of aromatic compounds owing to their aromaticity. According to the chemical formula, aromatic compounds show a high degree of unsaturation. However, these compounds are less likely to undergo addition reactions unlike their corresponding unsaturated aliphatic compounds and instead they prefer to undergo substitution reactions. The molecules of aromatic compounds are more thermodynamically stable as they show low heats of combustion and hydrogenation. According to X-ray and electron diffraction methods, the molecules of aromatic compounds are flat.

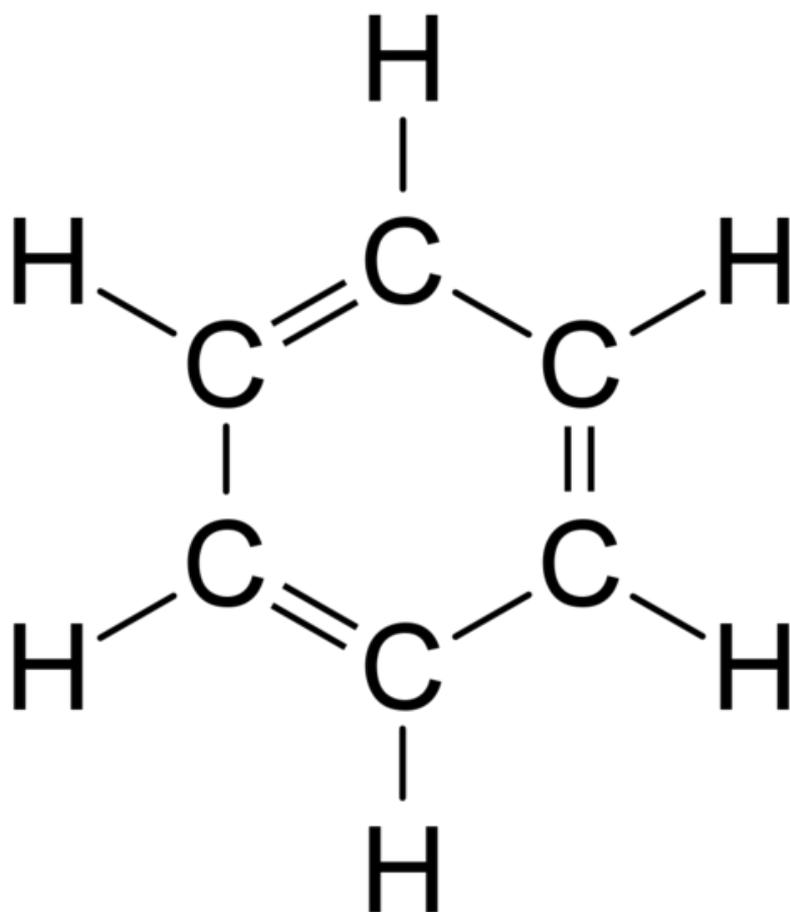


Figure 02: Benzene

The name 'aromatic' emerged from the Greek word *aroma*, meaning pleasant smell, is used to these compounds as most of these compounds have pleasant odors. Some examples of aromatic compounds include phenol, naphthalene, anthracene etc.

What is the Difference Between Alicyclic and Aromatic Compounds?

Alicyclic vs Aromatic	
Alicyclic compounds are organic compounds formed by the joining of two carbon atoms of an aliphatic chain through a covalent bond.	Aromatic compounds are organic compounds with conjugated rings in an alternative arrangement of double and single bonds resulting aromaticity.
Ring Type	
Alicyclic compounds have closed ring that may be saturated or unsaturated.	Aromatic compounds have closed ring with high degree of unsaturation.
Chemical Reaction Type	
Alicyclic compounds undergo addition reaction if multiple bonds are present.	Aromatic compounds undergo substitution reactions, and less likely to undergo addition reactions.
Nature of Properties	
Alicyclic compounds resembles the properties of aliphatic compounds	Aromatic compounds resembles aromaticity due to delocalized bonds.
Smell	
Most of the alicyclic compounds do not have pleasant smell	Most of the aromatic compounds have pleasant smell
Examples	
Cyclopropane, cyclohexane, steroids etc.	Benzene, phenol, naphthalene, anthracene

Summary - Alicyclic vs Aromatic Compounds

Alicyclic and aromatic compounds are two groups of cyclic organic compounds that show a different set of properties. Alicyclic compounds are formed from aliphatic compounds, thus have properties similar to aliphatic compounds. Aromatic compounds have conjugated rings that show aromaticity. Aliphatic compounds may be saturated or unsaturated, whereas aromatic compounds are unsaturated and have double and single bonds arranged alternatively in the ring. This is the difference between alicyclic and aromatic compounds.

Reference:

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