

Heterocyclic and Homocyclic Compounds Encyclopedia Article

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Heterocyclic and Homocyclic Compounds

Complex molecules, consisting of many atoms chemically bonded together, may have atoms arranged linearly or in rings. *Heterocyclic* and *homocyclic* compounds are examples of molecules in which the constituent atoms form rings. The cyclic portion of the name indicates their **ring** nature. The *hetero-* (from Greek meaning different) or *homo-* (from Greek meaning same) prefix refers to the composition of atoms in the **molecule**.

Homocyclic compounds are molecules that are, or contain, ring structures that consist only of **carbon** atoms within the ring. An example is **benzene**. Benzene is a homocyclic compound of six carbon atoms bonded together in a hexagonal ring, with one **hydrogen atom** bonded to each of the six carbons. Benzene is a highly toxic and volatile compound sometimes used in cleaning solutions. Phenol is another common homocyclic compound. Phenol, sometimes used as an antiseptic, is a benzene ring with a hydroxide group substituted for one hydrogen in the ring. Cyclohexane is another homocyclic molecule. In contrast, heterocyclic compounds, or groups, are rings containing at least one non-carbon atom in the ring. An example is heterocyclic amines which are six-membered rings of five carbons and one **nitrogen** atom. Heterocyclic compounds have an immense range of properties and uses and even constitute their own branch of **chemistry** (heterocyclic chemistry). A small set of examples in which heterocyclic compounds are used includes dyes, photochromes of film, **pesticides**, antiviral medications, and **food additives**. Many biologically important molecules are heterocyclic. **DNA** nucleotide bases, for example, are heterocyclic molecules. Also, the development of heterocyclic antidepressants, namely Prozac, have contributed greatly to the treatment of disease.