

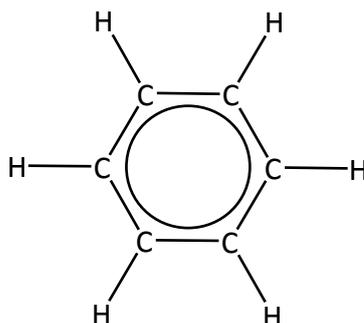
## Answer on Question #43824 - Chemistry - Inorganic Chemistry

### Question:

Describe the benzene molecule.

### Solution:

Benzene is chemical compound with molecular formula  $C_6H_6$ . Benzene belongs to aromatic hydrocarbons with general formula  $C_nH_{2n-6}$ ,  $n = 1, 2, 3 \dots$



Each carbon atom is connected with another two carbon atoms and with one hydrogen atom, forming six-membered ring. Bond length (C – C) is 139 pm, bond length (C – H) is 109 pm, angles (C–C–H) and (C–C–C) are equal and come to 120°. All atoms are in the plane of the molecule, it is planar.

Hybridization of carbon atoms is  $sp^2$  in benzene molecule. Three  $sp^2$ -hybridized orbitals of each carbon atom are trigonal planar (120 °), the rest 6  $\pi$ -orbitals of each carbon atom are normal to molecular plane, forming delocalized  $\pi$ -system. Delocalized  $\pi$ -system generates two circles above and below cycle plane. The  $\pi$ -system in benzene is marked with circle in the center of the molecule.

Formation of the delocalized  $\pi$ -system is energetically profitable for benzene, and it is feature of the aromaticity. The aromaticity causes equal bonds of C – C and C – H, tendency to substitution reactions, and high stability of the delocalized  $\pi$ -system and aromatic ring in general.