Phenyl Group Encyclopedia Article

Phenyl Group

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Phenyl Group

The phenyl group is a monovalent organic radical, derived from **benzene**. It has the chemical formula C_6H_5 and it is sometimes abbreviated to -Ph. The phenyl group is a modifier of organic functional groups. The phenyl group is basically a benzene **ring** with a **hydrogen** removed. The phenyl group is a ring structure, and as such, it is an aryl group (an organic group derived from an aromatic hydrocarbon with the absence of one hydrogen).

Similar to other organic modifier groups, the phenyl group alters the physical and chemical properties of the substance it bonds to. For example, the **boiling point** of a chemical can be increased by replacing a hydrogen **atom** with the phenyl group. In general as the **molecular weight** of a compound increases, the boiling point increases. The phenyl group is unsaturated, that is there are double bonds present that do not have the maximum number of hydrogens attached to them. As such, compounds containing the phenyl group are able to participate in all of the reactions of an unsaturated compound. They are able to undergo **hydrogenation** with hydrogen adding across the double bonds.**Bromine water** added to a compound with the phenyl group will decolorize. This is a standard test for unsaturated compounds.

The polymer **polystyrene** contains the phenyl group as part of its repeat unit. The organic chemical phenol could also be called phenyl hydroxide, it has the chemical formula C_6H_5OH.

Phenylalanine contains the phenyl group and is one of only three **amino acids** containing an aromatic group (a ring structure). As part of the **metabolism** of phenylalanine, **oxygen** is used to break the ring structure, and eventually after several intermediate steps, the aliphatic (straight chain) molecules fumarate and acetoacetate are produced. The absence of the functioning **enzyme** that catalyzes this reaction produces a disease called phenylketonuria, which is genetically controlled and leads to mental disorders.**Aniline** itself contains the phenyl group and its formula can be written as $PhNH_2$. Aniline is used in the manufacture of a number of products including dyes, pharmaceuticals, **antioxidants**, and vulcanization accelerators in rubber compounds.

The phenyl group is often encountered as an intermediate in many organic reactions. This is particularly common in reactions occurring in **solution**. The phenyl group by itself is unstable and, as such, will rapidly react with some other compound.