



Alcohols and Phenols Database

This database contains 1,922 infrared spectra of alcohol and phenol compounds. This collection of organic compounds can be used for identification, classification, and verification of these materials.

An alcohol molecule has the general formula ROH where R is an alkyl group, O is an oxygen atom and H is a hydrogen atom. One hydrogen atom has been replaced by an alkyl group, so alcohols can be thought of as analogs of water. Phenols have a similar formula, ROH, but R is an aryl group. The simplest example of a phenol, C₆H₅OH, is named phenol.

In alcohols, the -OH group is attached to a tetrahedral carbon atom. If the carbon atom is bonded to three hydrogens in addition to the -OH, the alcohol is methanol. If the carbon that is bonded to the -OH is bonded to one carbon and two hydrogens, the alcohol is a primary alcohol. If the carbon that is bonded to the -OH is bonded to two carbons and one hydrogen, the alcohol is a secondary alcohol. If the carbon that is bonded to the -OH is bonded to three carbons, the alcohol is a tertiary alcohol. All of these alcohols share some characteristics but other characteristics are different owing to their different structures.

In phenols, the -OH group is directly attached to a carbon that is part of an aromatic ring. Alcohols and phenols are similar in some ways, but there are enough differences so that they are considered different functional groups. One major difference is that phenols are typically about a million times more acidic than alcohols. Addition of sufficient aqueous sodium hydroxide to a phenol will cause the -OH group of most of the molecules present to be deprotonated; this will not happen to an alcohol.

Usually, the larger an alcohol or phenol, the higher the boiling point. As the alcohol size increases the probability that the alcohol will be a solid material increases. Many phenols are solids. Small alcohols are water soluble because the hydroxyl group can hydrogen bond with water molecules. But as the size of the alkyl group increases the solubility in water decreases. This is the result of the alkyl group disrupting hydrogen bonding among the water molecules.

Each compound in the database is identified by its chemical name and the method of analysis as well as structural formula, molecular formula, and molecular weight. Synonyms, melting points, boiling points, literature references, and comments may be displayed when available.

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