Pentyl Group Encyclopedia Article

Pentyl Group

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Unbranched alkanes are compounds containing only **carbon** and **hydrogen** atoms in continuous **chains**. Branched-chain alkanes, on the other hand, contain short carbon chains (known as alkyl groups) attached to longer carbon skeletons. The convention is to name the **alkyl group** using the Greek word for the number of carbon atoms present. Thus, the alkyl group with five carbons is referred to as a pentyl group, which is the name obtained by dropping the *-ane* suffix from the five-carbon unbranched chain (pentane, having the **structural formula** $CH_3CH_2CH_2CH_2CH_3$), and substituting a *-yl* ending.

The pentyl group (also known as an amyl group), therefore, corresponds to the five-carbon aliphatic group C_5H_{11}. This group has eight possible constitutional as isomeric arrangements (excluding optical isomers); the structure of the simplest of these, i.e., the n-pentyl group, is $CH_3CH_2CH_2CH_2CH_2$-(where the n- prefix is an abbreviation for "normal." Compounds containing pentyl groups usually occur as as mixtures of several isomers. Because the as boiling points of these compounds are close and their other properties are similar, the expense and difficulty of separating them is seldom warranted. Amyl compounds, i.e., those containing pentyl groups, exist in fusel oils; they can also be formed from petroleum pentanes.

The amyl alcohols ($C_5H_{11}OH$), which are among the simplest of compounds containing pentyl groups, have the following eight isomeric structures (excluding optical isomers): n-amyl **alcohol**, primary or $CH_3(CH_2)_4OH$; 2-meth yl-1-butanol or $CH_3CH_2CH(CH_3)CH_2OH$; isoamyl alcohol, primary or $(CH_3)_2CHCH_2CH_2OH$; 2-pentanol or $CH_3CH_2CH_2CH_2OCH_3$, 3-pentanol or $CH_3CH_2CHOHCH_2CH_3$; tert-amyl alcohol or $(CH_3)_2C(OH)CH_2CH_3$; sec-isoamyl alcohol or $CH_3CHOHCH(CH_3)_2$; and 2,2-dimethyl-1-propanol or $(CH_3)_3CCH_2OH$. The isomers n-amyl alcohol, primary; 2-pentanol; and 3-pentanol exist as linear, unbranched chains of carbon and hydrogen atoms, whereas the isomers 2 methyl-1-butanol;isoamyl alcohol, primary; tert-amyl alcohol; sec-isoamyl alcohol;and 2,2 dimethyl-1 propanol are branched compounds.The isomers 2-methyl-1-butanol; 2-pentanol; and sec-isoamyl alcohol are chiral and exhibit **optical activity**.