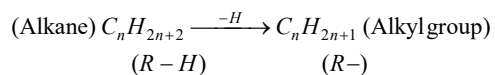


## Alkyl groups

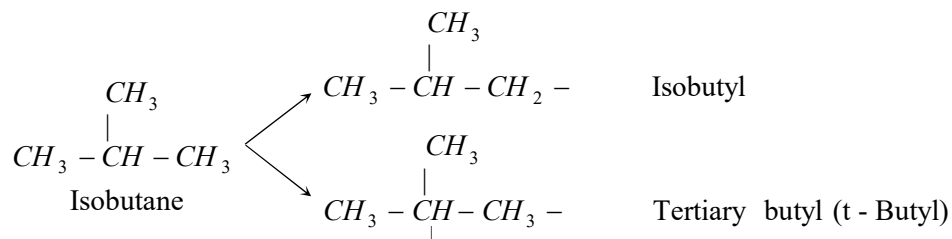
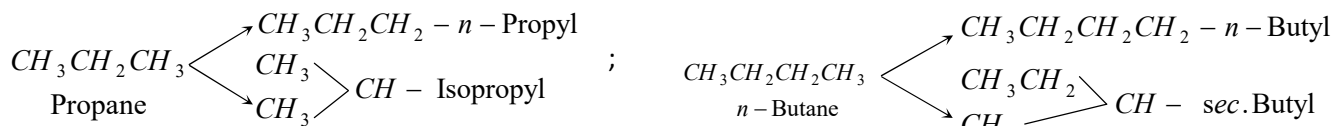
These are univalent groups or radicals obtained by the removal of one hydrogen atom from a molecule of a paraffin. The symbol 'R' is often used to represent an alkyl group.



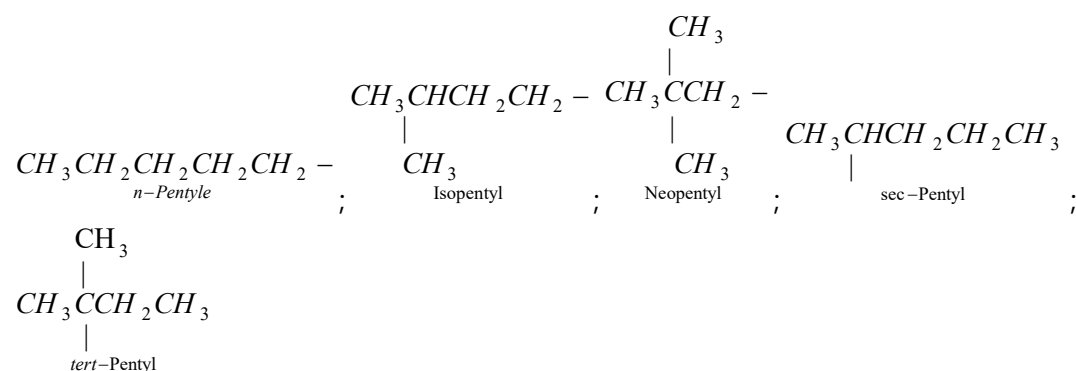
Alkyl groups are named by dropping-ane from the name of corresponding paraffin and adding the ending-yl.

Parent saturated hydrocarbon	Name of the alkyl group	Structure	Parent saturated hydrocarbon	Name of the alkyl group	Structure
Methane	Methyl	CH <sub>3</sub> –	Propane	n-Propyl	CH <sub>3</sub> – CH <sub>2</sub> – CH <sub>2</sub> –
Ethane	Ethyl	CH <sub>3</sub> – CH- 2 –	Butane	n-Butyl	CH <sub>3</sub> – CH <sub>2</sub> – CH <sub>2</sub> – CH <sub>2</sub> –

Alkyl groups derived from saturated hydrocarbons having three or more carbon atoms exist in isomeric forms.



Similarly, removal of different H atoms in pentane gives the following radicals:



Note: The prefix sec- or tert- before the name of the group indicate that the H-atom was removed from a secondary or tertiary carbon atom respectively.

### Unsaturated groups or radicals

Group	Common name	IUPAC name	Group	Common name	IUPAC name
$\text{CH}_2 = \text{CH} -$	vinyl	Ethenyl	$\text{HC} \equiv \text{C} -$	Acetylide	Ethynyl
$\text{CH}_2 = \overset{2}{\text{C}}\text{H} - \overset{1}{\text{C}}\text{H}_2 -$	Allyl	2-Propenyl	$\text{HC} \equiv \overset{2}{\text{C}} - \overset{1}{\text{C}}\text{H}_2 -$	Propargyl	2-Propynyl
$\text{CH}_3 - \text{CH} = \overset{1}{\text{C}}\text{H} -$	-	1-Propenyl			

### Different classes of organic compounds

S. No.	Homologous series	Structural formula	Root word	Primary suffix	Secondary suffix	IUPAC Name
1.	Paraffins or Alkanes ( $\text{C}_n\text{H}_{2n+2}$ )	$\overset{1}{\text{C}}\text{H}_4$	Meth	-ane	-	Methane
		$\overset{2}{\text{C}}\text{H}_3 - \overset{1}{\text{C}}\text{H}_3$	Eth	-ane	-	Ethane

		$\begin{array}{c} 3 & 2 & 1 \\ \text{C} & \text{H}_2 & \text{C} & \text{H}_3 \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H}_2 & \text{C} & \text{H}_3 \end{array}$	Prop	-ane	–	Propane
			But	-ane	–	Butane
2.	Olefins or Alkenes ( $C_nH_{2n}$ )	$\begin{array}{c} 2 & 1 \\ \text{C} & \text{H}_2 = \text{C} & \text{H}_2 \\ 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H} = \text{C} & \text{H}_2 \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H} = \text{C} & \text{H}_2 \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H} = \text{C} & \text{H} & \text{C} & \text{H}_3 \end{array}$	Eth	-ene	–	Ethene
			Prop	-ene	–	Propene
			But	-ene	–	1-Butene
			But	-ene	–	2-Butene
3.	Acetylenes or Alkynes ( $C_nH_{2n-2}$ )	$\begin{array}{c} 2 & 1 \\ \text{C} & \text{H} \equiv \text{C} & \text{H} \\ 3 & 2 & 1 \\ \text{C} & \text{H}_3 - \text{C} \equiv \text{C} & \text{H} \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 - \text{C} \equiv \text{C} & \text{H} \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 - \text{C} \equiv \text{C} - \text{C} & \text{H}_3 \end{array}$	Eth	-yne	–	Ethyne
			Prop	-yne	–	Propyne
			But	-yne	–	1-Butyne
			But	-yne	–	2-Butyne
4.	Monohydric Alcohols ( $C_nH_{2n+1}OH$ )	$\begin{array}{c} 1 \\ \text{C} & \text{H}_3 & \text{O} & \text{H} \\ 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{O} & \text{H} \\ 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H}_2 & \text{O} & \text{H} \\ 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H} & \text{O} & \text{H} & \text{C} & \text{H}_3 \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H}_2 & \text{C} & \text{H}_2 & \text{O} & \text{H} \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H} & \text{O} & \text{H} & \text{C} & \text{H}_3 \end{array}$	Meth	-ane	-ol	Methanol
			Eth	-ane	-ol	Ethanol
			Prop	-ane	-ol	1-Propanol
			Prop	-ane	-ol	2-Propanol
			But	-ane	-ol	1-Butanol
			But	-ane	-ol	2-Butanol
5.	Aldehydes ( $C_nH_{2n}O$ )	$\begin{array}{c} 1 \\ \text{H} & \text{C} & \text{H} & \text{O} \\ 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H} & \text{O} \\ 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H} & \text{O} \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H}_2 & \text{C} & \text{H} & \text{O} \end{array}$				
6.	Ketones ( $C_nH_{2n}O$ )	$\begin{array}{c} 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{O} & \text{C} & \text{H}_3 \\ 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{O} & \text{C} & \text{H}_3 \\ 5 & 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{H}_2 & \text{C} & \text{O} & \text{C} & \text{H}_3 \\ 5 & 4 & 3 & 2 & 1 \\ \text{C} & \text{H}_3 & \text{C} & \text{H}_2 & \text{C} & \text{O} & \text{C} & \text{H}_2 & \text{C} & \text{H}_3 \end{array}$				

7.	Carboxylic acid (Mono) ( $C_nH_{2n}O_2$ )	$H \overset{1}{C} OOH$ $\overset{2}{C} H_3 \overset{1}{C} OOH$ $\overset{3}{C} H_3 \overset{2}{C} H_2 \overset{1}{C} OOH$ $\overset{4}{C} H_3 \overset{3}{C} H_2 \overset{2}{C} H_2 \overset{1}{C} OOH$				
8.	Acid Chlorides (RCOCl)	$\overset{2}{C} H_3 \overset{1}{C} OCl$ $\overset{3}{C} H_3 \overset{2}{C} H_2 \overset{1}{C} OCl$ $\overset{4}{C} H_3 \overset{3}{C} H_2 \overset{2}{C} H_2 \overset{1}{C} OCl$				
9.	Acid amides ( $RCONH_2$ )	$\overset{2}{C} H_3 \overset{1}{C} ONH_2$ $\overset{3}{C} H_3 \overset{2}{C} H_2 \overset{1}{C} ONH_2$ $\overset{4}{C} H_3 \overset{3}{C} H_2 \overset{2}{C} H_2 \overset{1}{C} ONH_2$				
10.	Esters (RCOOR')	$H \overset{1}{C} OOC H_3$ $\overset{2}{C} H_3 \overset{1}{C} OOC_2H_5$ $\overset{2}{C} H_3 \overset{1}{C} OOC H_3$ $\overset{3}{C} H_3 - \overset{2}{C} H_2 \overset{1}{C} OOC_2H_5$				
11.	Anhydrides ( $(RCO)_2O$ )	$(CH_3 - CO)_2O$ $(C_2H_5 - CO)_2O$				
12.	Amines ( $R - NH_2$ ) Primary	$\overset{1}{C} H_3 NH_2$ $\overset{2}{C} H_3 \overset{1}{C} H_2 NH_2$ $\overset{3}{C} H_3 \overset{2}{C} H_2 \overset{1}{C} H_2 NH_2$ $\overset{3}{C} H_3 \overset{2}{C} H NH_2 \overset{1}{C} H_3$				
Cyanides or nitriles (R-CN)	$\overset{2}{C} H_3 \overset{1}{C} N$ $\overset{3}{C} H_3 \overset{2}{C} H_2 \overset{1}{C} N$ $\overset{4}{C} H_3 \overset{3}{C} H_2 \overset{2}{C} H_2 \overset{1}{C} N$	Eth	-ane	nitrile	Ethane nitrile	
		Prop	-ane	nitrile	Propane nitrile	
		But	-ane	nitrile	Butane nitrile	
Alkyl halides ( $C_nH_{2n+1}X$ )	$\overset{1}{C} H_3 Cl$ $\overset{2}{C} H_3 \overset{1}{C} H_2 Cl$ $\overset{3}{C} H_3 \overset{2}{C} H_2 \overset{1}{C} H_2 Br$	Meth	-ane	Chloro	Chloromethane	
		Eth	-ane	Chloro	Chloroethane	
		Prop	-ane	Bromo	1-Bromopropane	
		Prop	-ane	Bromo	2-Bromopropane	

	$\overset{3}{C}H_3\overset{2}{C}HBr\overset{1}{C}H_3$				
Ethers (R – O – R)	$\overset{1}{C}H_3OCH_3$ $\overset{2}{C}H_3\overset{1}{C}H_2OCH_3$ $\overset{2}{C}H_3\overset{1}{C}H_2OC_2H_5$	Meth Eth Eth	-ane -ane -ane	Methoxy Methoxy Ethoxy	Methoxymethane Methoxyethane Ethoxyethane
Nitro compounds (R – NO <sub>2</sub> )	$\overset{1}{C}H_3NO_2$ $\overset{2}{C}H_3\overset{1}{C}H_2NO_2$ $\overset{3}{C}H_3\overset{2}{C}H_2\overset{1}{C}H_2NO_2$ $\overset{3}{C}H_3\overset{2}{C}HNO_2\overset{1}{C}H_3$	Meth Eth Prop Prop	-ane -ane -ane -ane	Nitro Nitro Nitro Nitro	Nitromethane Nitroethane 1-Nitropropane 2-Nitropropane