

### Formulae of functional groups

The **general** formula is a formula that represents a homologous series of compounds using letters and numbers.

A **homologous series** is a group of organic compounds that have the same functional group, the same general formula, and the same chemical properties.

The **structural formula** is a formula that shows how the atoms are bonded to each carbon atom in a molecule.

The **displayed formula** is a 2D representation of an organic molecule showing all its atoms (by their symbols) and their bonds (by single, double, or triple bonds).

The **skeletal formula** is a simplified displayed formula with all the carbon and hydrogen (C-H) bonds removed.

### Molecular & Empirical Formulae

The **molecular formula** shows the *number and type* of each atom in a molecule Eg. the molecular formula of ethanoic acid is C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>

The **empirical formula** shows the *simplest whole number ratio* of the elements present in one molecule of the compound Eg. the empirical formula of ethanol is CH<sub>2</sub>O

### Formulae of functional groups

Functional Group	General Formula	Structural Formula	Displayed Formula	Skeletal Formula	Name
Alkane	C <sub>n</sub> H <sub>2n+2</sub>				ethane
Alkene	C <sub>n</sub> H <sub>2n</sub>				ethene
Arene	C <sub>n</sub> H <sub>2n-6</sub> number of C atoms minus 6		N/A		benzene
Haloalkane	C <sub>n</sub> H <sub>2n+1</sub> X halogen				chloroethane
Haloarene	C <sub>n</sub> H <sub>2n-6</sub> X		N/A		chlorobenzene
Alcohol	C <sub>n</sub> H <sub>2n+1</sub> OH				ethanol

			propan-2-ol
			2-methylpropan-2-ol

### Formulae of functional groups

Phenol	C <sub>6</sub> H <sub>5</sub> OH		N/A		phenol
Aldehyde	C <sub>n</sub> H <sub>2n</sub> CHO				ethanal

Ketone	C <sub>n</sub> H <sub>2n</sub> O				propanone
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Carboxylic Acids	C <sub>n</sub> H <sub>2n</sub> COOH				ethanoic acid
Esters	C <sub>n</sub> H <sub>2n</sub> O <sub>2</sub>				methyl methanoate
Acyl chloride	RCOCl				ethanoyl chloride
Amine	C <sub>n</sub> H <sub>2n+1</sub> N				dimethylamine

### Nomenclature of Aliphatic Compounds

Nomenclature of organic compounds table

Number of C atoms	Molecular formula of straight-chain alkane	Name of alkane	Stem used in naming
1	CH <sub>4</sub>	methane	meth-
2	C <sub>2</sub> H <sub>6</sub>	ethane	eth-
3	C <sub>3</sub> H <sub>8</sub>	propane	prop-
4	C <sub>4</sub> H <sub>10</sub>	butane	but-
5	C <sub>5</sub> H <sub>12</sub>	pentane	pent-
6	C <sub>6</sub> H <sub>14</sub>	hexane	hex-
7	C <sub>7</sub> H <sub>16</sub>	heptane	hept-
8	C <sub>8</sub> H <sub>18</sub>	octane	oct-
9	C <sub>9</sub> H <sub>20</sub>	nonane	non-
10	C <sub>10</sub> H <sub>22</sub>	decane	dec-

### Functional groups & their nomenclature table

Functional Group	Nomenclature	Example	Name
Alkenes	-ene		Ethene
Haloalkanes	chloro-, fluoro-, bromo-, iodo-		Chloroethane
Alcohols	-ol		Ethanol
Aldehydes	-al		Ethanal
Ketones	-one		Propanone
Carboxylic Acids	-oic acid		Ethanoic acid
Esters	alkyl -oate		Propyl Ethanoate
Amines	alkyl -amine		Ethylamine
Nitriles	-nitrile		Ethane nitrile



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Not published yet.  
Last updated 26th August, 2022.  
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