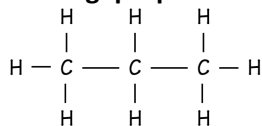


What are functional groups?

They are collections of atoms that have a common pattern of reactivity. Note: Combustion has not been included in the "Reactivity" below although many of these will burn very well indeed! Substitution reactions include esterification, condensation, hydrolysis (reaction with water) and polymerisation.

Alkane – a hydrocarbon with only single bonds e.g. propane



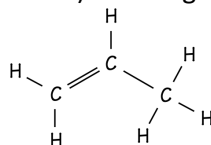
Suffix: "ane"

As a substituent: "alkyl"

Nonpolar.

Reactivity: substitution

Alkene – a hydrocarbon with (at least) one C=C (double) bond e.g. propene



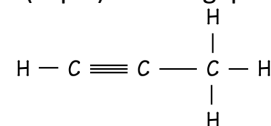
Suffix: "ene"

Nonpolar.

Can't rotate about the C=C; shows geometrical isomerism (cis/trans)

Reactivity: addition, oxidation

Alkyne - a hydrocarbon with (at least) one C≡C (triple) bond e.g. propyne

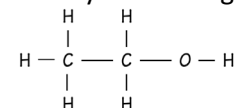


Suffix: "yne"

Nonpolar.

Reactivity: addition reactions, oxidation

Alcohol – the –OH group is an alcohol (unless attached to a C=O where it is part of a carboxylic acid. E.g. ethanol



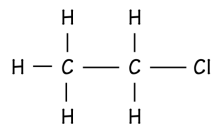
Suffix: "ol"

As substituent "hydroxy"

Polar as –OH group can hydrogen bond.

Reactivity: substitution, elimination, oxidation

Alkyl halide / haloalkane – an alkyl group attached to a halogen e.g. chloroethane



Suffix: "ane"

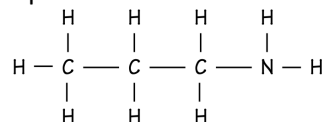
Halogens names as fluoro, chloro, bromo, iodo

Generally regarded as non-polar (but more polar than alkanes).

Reactivity: substitution, elimination

Amine – NH₂ attached to a C (secondary amines R₂NH, tertiary amines R₃N).

e.g. propan-1-amine



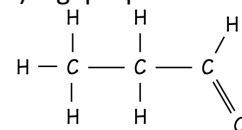
Suffix: "amine"

As substituent: "amino"

Polar as –NH₂ group takes part in hydrogen bonding (less than –OH).

Reactivity: acid-base, substitution

Aldehyde – a –C=O (carbonyl) on the end of a chain (attached to H and another C) e.g. propanal

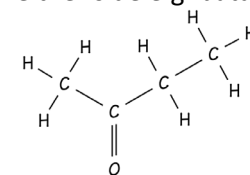


Suffix: "al"

Somewhat polar due to C=O (but less than –OH; dipole-dipole).

Reactivity: oxidation and reduction

Ketone – a –C=O (carbonyl) with a C atom on either side e.g. butanone

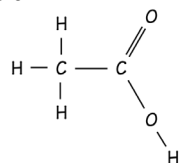


Suffix: "one"

Somewhat polar due to C=O (but less than –OH; dipole-dipole).

Reactivity: reduction

Carboxylic acid – a –C=O (carbonyl) on the same C atom as an –OH e.g. ethanoic acid

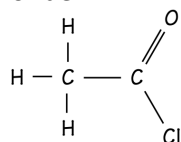


Suffix: "oic acid"

Polar as –OH group can hydrogen bond.

Reactivity: acid-base, substitution

Acid / acyl halide – a –C=O (carbonyl) on the same C atom as a halogen e.g. ethanoyl chloride

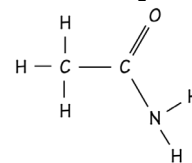


Suffix: "oyl halide" (here –oyl chloride)

Polar (less than –OH; dipole-dipole).

Reactivity: substitution

Amide - a –C=O (carbonyl) on the same C atom as a –NH₂ or –NH-

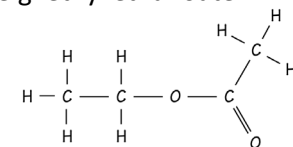


Suffix: "amide"

Polar as –NH₂ group can hydrogen bond.

Reactivity: hydrolysis

Ester – a carbonyl (C=O) adjacent to an alkoxy (OR) and an R group is an ester e.g. ethyl ethanoate



Suffix: "...yl ...oate"

Regarded as non-polar

Reactivity: substitution

