

one carbon skeleton, one functional group, and the rules that name and break both

## Classifying carbon skeletons

### Open chain (acyclic)

carbon atoms in a straight or branched chain, no ring anywhere, e.g. butane

### Alicyclic

carbon atoms joined into a ring, but not the special benzene-type ring, e.g. cyclohexane

### Aromatic

built around benzene's ring, a delocalised, unusually stable pi system, e.g. toluene

## IUPAC nomenclature, the four steps

- find the longest chain containing the principal characteristic group, if there is one
- that chain's carbon count fixes the root word (meth, eth, prop, but, pent...)
- number the chain so the principal group gets the lowest locant (or first point of difference)
- name every branch as a substituent prefix, alphabetised, each with its own locant
- assemble: locants + substituent prefixes + root + suffix for the principal group, e.g. 4-methylpentanoic acid

a name is just an address: which chain, which house number (locant), which group lives there

## Structural isomerism, in four flavours \*

- chain isomerism: same molecular formula, the carbon skeleton itself branches differently, e.g. butane and 2-methylpropane
- position isomerism: same skeleton and group, at a different carbon, e.g. propan-1-ol/-2-ol
- functional isomerism: same formula, genuinely different functional groups
- e.g. ethanol (alcohol) and dimethyl ether (ether), both  $C_2H_6O$
- metamerism: same functional group, different alkyl groups either side of it
- e.g. diethyl ether and methyl propyl ether, both  $C_4H_{10}O$

## Suffixes for the common functional groups, by falling seniority

| Group                    | Suffix    | Example       |
|--------------------------|-----------|---------------|
| -COOH, carboxylic acid   | -oic acid | ethanoic acid |
| -CHO, aldehyde           | -al       | ethanal       |
| >C=O, ketone             | -one      | propan-2-one  |
| -OH, alcohol             | -ol       | ethanol       |
| -NH <sub>2</sub> , amine | -amine    | ethanamine    |
| C=C, alkene              | -ene      | ethene        |
| C≡C, alkyne              | -yne      | ethyne        |

seniority runs roughly acid > ester > amide > nitrile > aldehyde > ketone > alcohol > amine: whichever group sits highest becomes the suffix, every group below it is just named as a prefix (oxo-, hydroxy-, amino-...)