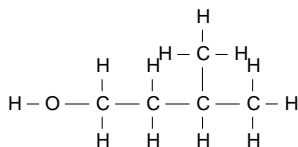


## AS91165 ORGANIC CHEMISTRY

### NAMING

Each part of the name gives you some useful information about the compound. To understand the name 3-methylbutan-1-ol you need to take the name to pieces.

#### 3-methylbutan-1-ol



You will need to remember the names for the number of carbon atoms in a chain up to 6 carbons.

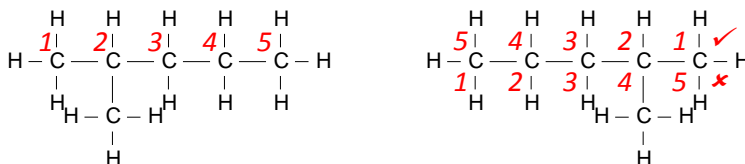
**meth = 1, eth = 2, prop = 3, but = 4, pent = 5 and hex = 6**

The “**but**” tells you there are four carbon atoms in the longest chain. The “**an**” which follows the “but” tells you that there aren't any carbon-carbon double bonds, just single bonds. The other two parts of this name tell you about what is attached to the first and third carbon atom in the chain. In this case there is a methyl group on carbon atom 3 and an alcohol group on carbon atom 1.

The “an” shows carbon-carbon single bonds only, while “en” contains a carbon-carbon double bond, e.g. but-2-**ene**.

Methane, CH<sub>4</sub>, and ethane, C<sub>2</sub>H<sub>6</sub>, are alkanes. If you remove a hydrogen atom from one of these you get an alkyl group. CH<sub>3</sub>- is a methyl group, and C<sub>2</sub>H<sub>5</sub>- is an ethyl group etc. These groups must always be attached to something else.

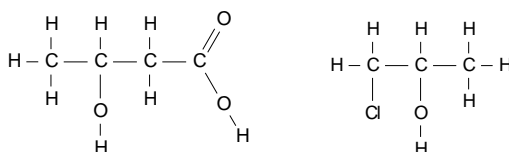
Look at this example; they are the same - they are both 2-methyl pentane



Why 2 as opposed to 4? Why do we choose to number from this particular end? The convention is to number from the end which produces the lowest numbers in the name - hence 2- rather than 4-.

Things to watch out for:

- C can only have 4 bonds! C always has 4 bonds! And yes you do have to draw “all those hydrogens” ...
- If you put an -OH group on a left end carbon, turn it to say HO- otherwise you will draw a bond coming out of the H, i.e. OH-CH<sub>2</sub>-CH<sub>2</sub>- etc and it will be marked **WRONG!** It must say HO-CH<sub>2</sub>-CH<sub>2</sub>- etc
- Some things get named in a “priority order”. At this level carboxylic acid > alcohol > halogen  
e.g. 3-hydroxybutanoic acid has an -OH (alcohol) group on C atom 3 of butanoic acid. The second example is 1-chloropropan-2-ol (rather than 2-hydroxy-1-chloropropane)



Print the next 2 pages: Students were either asked to draw these or name these in recent past papers.

Cover the Name and Notes column & name the structures drawn. Check your answers and use the notes to help if you got any wrong. Then cover the structural formula and notes and try to draw the structures under the names. Check as before. Practice makes perfect!!

Structural formula	Name	Notes
$  \begin{array}{ccccccc}  & \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{O} \\  &   & &   & &   & &   & & // \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{C} \\  &   & &   & &   & &   & & \backslash \\  & \text{H} & & \text{H} & & \text{H} & & \text{H} & & \text{O} - \text{H}  \end{array}  $	Pentanoic acid	<p>Longest C chain is 5 so "Pent"</p> <p>-COOH functional group so it's a carboxylic acid</p> <p>There is no need to number the -COOH functional group as it is automatically 1.</p>
$  \begin{array}{ccccccc}  & & & & & & \\  & & & & & & \\  \text{CH} & \equiv & \text{C} & - & \text{CH} & - & \text{CH}_3 \\  & & & &   & & \\  & & & & \text{CH}_3 & &   \end{array}  $	3-methylbut-1-yne	<p>Longest C chain of 4 so "but"</p> <p>Triple bond so "yne", after C atom number 1 (so but-1-yne). Name position of C≡C before numbering any side chains.</p> <p>Methyl group is CH<sub>3</sub>- group and is on C atom number 3</p>
$  \begin{array}{ccccccc}  & & & \text{Cl} & & & \\  & & &   & & & \\  \text{CH}_3 & - & \text{C} & - & \text{CH}_2 & - & \text{CH}_3 \\  & &   & & & & \\  & & \text{OH} & & & &   \end{array}  $	2-chlorobutan-2-ol	<p>Longest C chain of 4 so "but"</p> <p>-OH alcohol functional group so "ol", on carbon atom 2 (as -2-ol)</p> <p>Cl- group on carbon atom number 2</p> <p>Note: butan-2-ol not "but-2-ol"</p>
$  \begin{array}{ccccccc}  & \text{H} & & & & \text{H} & & \text{H} \\  &   & & & &   & &   \\  \text{H} & - \text{C} & = & \text{C} & - & \text{C} & - & \text{C} - \text{H} \\  & & \backslash & / & &   & &   \\  & & \text{H} & & \text{H} & & \text{H} &   \end{array}  $	But-1-ene	<p>Longest C chain of 4 so "but"</p> <p>Double bond so "ene", after C atom number 1</p>
$  \begin{array}{ccccccc}  \text{CH}_3 & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_2 \\  & & & &   & &   \\  & & & & \text{Cl} & & \text{Cl}  \end{array}  $	1,2-dichlorobutane	<p>Longest C chain of 4 so "but"</p> <p>"ane" since all C-C bonds are single</p> <p>"chloro" as -Cl, but "dichloro" since there are 2 x -Cl ; 1,2 as the -Cl are on carbon atoms numbers 1 and 2</p>
$  \text{CH}_3 - \text{CH}_2 - \text{C} \equiv \text{C} - \text{CH}_3  $	Pent-2-yne	<p>Longest C chain of 5, so "pent"</p> <p>Triple bond so "yne"</p> <p>Occurs after C atom number 2 (counting from the right end)</p>
$  \begin{array}{ccccccc}  & \text{H} & & \text{H} & & \text{H} & & \text{H} \\  &   & &   & &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} - \text{H} \\  &   & &   & &   & &   \\  & \text{H} & &   & & \text{H} & & \text{H} \\  & & & \text{N} - \text{H} & & & &   \end{array}  $	2-aminobutane	<p>Longest C chain of 4, so "but"</p> <p>Based on butane so C-C single bonds</p> <p>Amino group -NH<sub>2</sub> on C atom 2</p>

Structural formula	Name	Notes
$  \begin{array}{c}  \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{OH} \\    \\  \text{Cl}  \end{array}  $	3-chlorobutan-1-ol	<p>Longest C chain of 4 so “but”</p> <p>-OH alcohol functional group so “ol”, on carbon atom 1 (as -1-ol)</p> <p>Cl- group on carbon atom number 3</p>
$  \begin{array}{cccc}  \text{H} & \text{H} & \text{H} & \text{H} \\    &   &   &   \\  \text{H} - \text{C} & - \text{C} & - \text{C} & - \text{N} - \text{H} \\    &   &   & \\  \text{H} & \text{H} & \text{H} &  \end{array}  $	1-aminopropane	<p>Longest C chain of 3, so “prop”</p> <p>Based on propane so C-C single bonds</p> <p>Amino group –NH<sub>2</sub> on C atom 1</p>
$  \begin{array}{ccccccc}  & & & \text{O} & & & \\  & & & // & & & \\  \text{CH}_3 - & \text{CH} - & \text{CH} - & \text{C} & & & \\    & &   & / & & & \\  \text{CH}_3 & & \text{Cl} & \text{OH} & & &  \end{array}  $	2-chloro-3-methylbutanoic acid	<p>Longest C chain of 4 so “but”</p> <p>-COOH functional group so it’s a carboxylic acid (it’s always on the end so no need to number as “1” but it is C atoms number 1). Cl- group on carbon atom number 2, methyl group on 3.</p>
$  \begin{array}{c}  \text{OH} \\    \\  \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3  \end{array}  $	Pentan-2-ol	<p>Longest C chain of 5 so “pent”</p> <p>-OH alcohol functional group so “ol”, on carbon atom 2 (as -2-ol)</p> <p>Note: pentan-2-ol not “pent-2-ol”</p>
$  \begin{array}{ccccccc}  & & & & & & \\  & & & & & & \\  \text{CH}_3 - & \text{CH}_2 - & \text{CH} - & \text{CH}_2 - & \text{Cl} \\  & &   & & \\  & & \text{Cl} & &  \end{array}  $	1,2-dichlorobutane	<p>Longest C chain of 5 so “pent”</p> <p>“Chloro” since –Cl, “dichloro” since there are 2 x –Cl</p> <p>1,2 as the –Cl are on carbon atoms numbers 1 and 2</p>
$  \begin{array}{c}  \text{CH}_3 - \text{C} \equiv \text{C} - \text{CH} - \text{CH}_3 \\    \\  \text{CH}_3  \end{array}  $	4-methylpent-2-yne	<p>Longest C chain of 5 so “pent”</p> <p>Triple bond so “yne”</p> <p>Occurs after C atom number 2 (counting from the left end)</p> <p>CH<sub>3</sub>- methyl group on carbon atom number 4</p>
$  \begin{array}{ccccccc}  & & & \text{H} & & & \\  & & &   & & & \\  \text{H} & \text{H} & \text{H} & \text{C} & \text{H} & \text{H} & \\    &   &   &   &   &   & \\  \text{H} - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\    &   &   &   & \\  \text{H} & \text{H} & \text{N} & \text{H} & \\  & &   & & \\  & & \text{H} & &  \end{array}  $	2-amino-3-methylbutane	<p>Longest C chain of 4, so “but”</p> <p>Based on butane so C-C single bonds</p> <p>Amino group –NH<sub>2</sub> on C atom 2</p> <p>Methyl group –CH<sub>3</sub> on C atom 3</p> <p><i>a</i> before <i>m</i> so 2-<u>a</u>mino and 3-<u>m</u>ethyl</p>