



ORGANIC NOMENCLATURE GUIDELINES

number of C atoms	1C	2C	3C	4C	5C	6C
start of name	meth	eth	prop	but	pent	hex

functional group		prefix	suffix	example name
alkane			ane	 propane
alkene			ene	 but-2-ene
halogenoalkane		fluoro / chloro / bromo / iodo		 2-bromopropane
alcohol		hydroxy	ol	 propan-1-ol
aldehyde *			al	 propanal
ketone		oxo	one	 butanone
carboxylic acid *			oic acid	 ethanoic acid
nitrile *			nitrile	 propanenitrile
amine		amino	amine	 ethanamine (ethylamine)
acyl chloride *			oyl chloride	 ethanoyl chloride
acid anhydride			oic anhydride	 ethanoic anhydride
ester			oate	 methyl propanoate
amide			amide	 ethanamide

* indicates this the C atom in this functional group is defined as carbon-1 in the chain

shading indicates that this prefix is only used if the suffix cannot be used

The naming of organic compounds is controlled by IUPAC (International Union of Pure and Applied Chemistry). This gives a very systematic way of naming all organic molecules.

Some guidance on naming organic molecules

1 Longest C chain

- look at the molecule to find the longest C chain – if there is a functional group it must be the longest C chain containing the functional group
- note that alkyl groups (e.g. methyl, ethyl, propyl) are not functional groups.

2 Number the C chain

- number the longest C chain (that contains the functional group) from the end that gives the functional group(s) the lowest numbers
- note that some functional groups (labelled * in the chart, e.g. aldehyde group) are carbon-1 in the chain by definition (and do not need a number themselves therefore), and define which end the numbers start for other groups
- note that we should only include numbers in names when they are necessary – but we usually only omit numbers in the simplest molecules where it is obvious that no number is needed

3 Putting the groups on the chain on the name

- groups that come off the C chain are given a number to show which C atom they are on (if necessary)
- when we write the name, these groups are listed in alphabetical order
- if there are several groups that are the same, then the prefix di (for two the same), tri (for three the same), tetra (for four the same), etc are added first (note that the prefix di/tri/tetra/etc is ignored when we work out alphabetical order)

Note

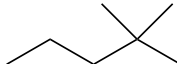
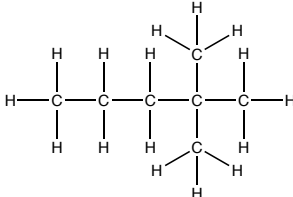
- numbers are separated by commas
- numbers and letters are separated by dashes

ALKANES

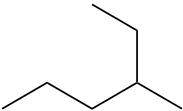
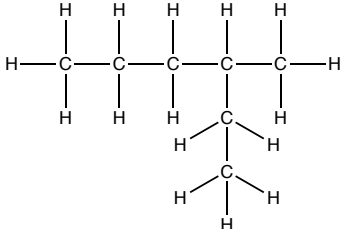
1	Structural formula	Skeletal formula	Name & comments
	$\begin{array}{c} \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$		Longest C chain is 5C atoms – so it is a <i>pentane</i> There is a methyl group coming off the chain. If the chain is counted from the left end it is <i>4-methyl</i>, but if it is numbered from the right end it is <i>2-methyl</i> which is a lower number. 2-methylpentane
	Displayed formula		

2	Structural formula	Skeletal formula	Name & comments
	$\begin{array}{c} \text{CH}_3-\text{CH}_2-\text{CH}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$		Longest C chain is 4C atoms – so it is a <i>butane</i> There is a methyl group coming off the chain. If the chain is counted from the left end it is <i>3-methyl</i>, but if it is numbered from the right end it is <i>2-methyl</i> which is a lower number.
	Displayed formula		However, the methyl group can only be on one of the two central C atoms, and would be <i>2-methyl</i> in each case. If it was on one of the end C atoms, it would be <i>pentane</i> and not <i>methylbutane</i>. As the methyl group can only be on carbon-2, it does not need a number for its position. methylbutane

3	Structural formula	Skeletal formula	Name & comments
			Longest C chain is 5C atoms – so it is a <i>pentane</i> There are two methyl groups coming off the chain. If the chain is counted from the left end they are on carbon-2 and carbon-3. If it is numbered from the right end they are on carbon-3 and carbon-4. Therefore we number from the left end to get the lower numbers. To show there are two methyl groups, we use <i>di</i>. 2,3-dimethylpentane
	Displayed formula		

4	Structural formula	Skeletal formula	Name & comments
	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{C}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$		Longest C chain is 5C atoms – so it is a <i>pentane</i> There are two methyl groups coming off the chain. If the chain is counted from the left end they are both on carbon-4. If it is numbered from the right end they are both on carbon-2. Therefore we number from the right end to get the lower numbers.
	Displayed formula		
			

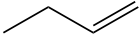
5	Structural formula	Skeletal formula	Name & comments
			Longest C chain is 5C atoms – so it is a <i>pentane</i> There are two methyl groups and one ethyl group coming off the chain. If the chain is counted from the left end, then we have <i>2-methyl</i>, <i>3-ethyl</i> and <i>3-methyl</i>. If it is numbered from the right we have <i>3-methyl</i>, <i>3-ethyl</i> and <i>4-methyl</i>. We get lower numbers if we number from the left end.
	Displayed formula		The groups are listed in alphabetical order, but we ignore the <i>di</i> of the dimethyl. Therefore, <i>ethyl</i> comes before <i>dimethyl</i> alphabetically. 3-ethyl-2,3-dimethylpentane

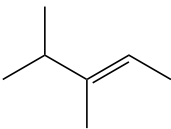
6	Structural formula	Skeletal formula	Name & comments
	$\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH} - \text{CH}_3 \\ \\ \text{CH}_2 \\ \\ \text{CH}_3 \end{array}$		Longest C chain is 6C atoms (not 5) – so it is a <i>hexane</i> There is one methyl group coming off the chain. If the chain is counted from the left end, then we have <i>4-methyl</i>. If it is numbered from the bottom we have <i>3-methyl</i>. We get the lower number if we number from the bottom.
	Displayed formula		
			

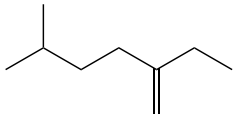
7	Structural formula	Skeletal formula	Displayed formula
	$ \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \quad \text{CH}_3 \\ \quad \quad \\ \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH} - \text{CH} - \text{CH}_3 \end{array} $		
	Name		

8	Structural formula	Skeletal formula	Displayed formula
	$ \begin{array}{c} \text{CH}_3 \quad \quad \text{CH}_3 \\ \quad \quad \\ \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{C} - \text{CH}_3 \\ \\ \text{CH}_2 \\ \\ \text{CH}_3 \end{array} $		
	Name		

ALKENES

9	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\text{CH}=\text{CH}_2$		Longest C chain that contains the C=C functional group is 4C atoms – so it is has a <i>but</i> stem. It has an alkene functional group and so is a <i>butene</i>. The C=C group could be in different places so needs a number. If we count from the right it is between carbon-1 and carbon-2. If we count from the left it is between carbon-3 and carbon-4. We count from the right therefore to get the lower number, so it is given number 1. but-1-ene
	Displayed formula		
	<pre> H H H H H — C — C — C = C H H H H </pre>		

10	Structural formula	Skeletal formula	Name & comments
	<pre> CH3 CH3 CH3 — CH — C = CH — CH3 </pre>		Longest C chain that contains the C=C functional group is 5C atoms – so it is has a <i>pent</i> stem. It has an alkene functional group and so is a <i>pentene</i>. We have two methyl groups and a C=C double bond that need numbers. The methyl groups are not functional groups, so the only functional group is the C=C. We count from the right to give the C=C the lowest number. This means that we have -2-ene, 3-methyl and 4-methyl. 3,4-dimethylpent-2-ene
	Displayed formula		
	<pre> H H H H — C — C — C = C — C — H H H H H H H H H H H </pre>		

11	Structural formula	Skeletal formula	Name & comments
	<pre> CH3 CH2 CH3 — CH — CH2 — CH2 — C — CH2 — CH3 </pre>		The longest C chain here has 7 C atoms, BUT it does not contain any functional group. The longest C chain that does contain the C=C functional group is 6 C atoms and so is a <i>hexene</i>. To get the lowest number for the C=C functional group, the numbering starts from the end with the C=C, and so it is -1-ene. There are a methyl group on carbon-5 and so it is 5-methyl. There is also an ethyl group on carbon-2 and so it is 2-ethyl. 2-ethyl comes before 5-methyl due to alphabetical order. 2-ethyl-5-methylhex-1-ene
	Displayed formula		
	<pre> H H H H H H H H — C — C — C — C — C — C — C — H H H H H H H H </pre>		

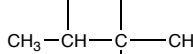
12	Structural formula	Skeletal formula	Displayed formula
	$\text{CH}_2=\text{CH}-\text{CH}_3$		
	Name		

13	Structural formula	Skeletal formula	Displayed formula
	<pre> CH3 CH3 — C = CH — CH3 </pre>		
	Name		

HALOGENOALKANES

14	Structural formula	Skeletal formula	Name & comments
			Longest C chain that contains the F functional group is 6C atoms – so it is has a <i>hex</i> stem. There is only one functional group (methyl and ethyl are not functional groups), and to give the F group the lowest number it is numbered from the right end, so it is <i>2-fluoro</i>.
	Displayed formula		There is a methyl group on carbon-5, so it is <i>5-methyl</i>, and an ethyl group on carbon-4, so it is <i>4-ethyl</i>. In alphabetical order, it goes <i>4-ethyl</i> then <i>2-fluoro</i> and then <i>5-methyl</i>. 4-ethyl-2-fluoro-5-methylhexane

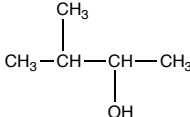
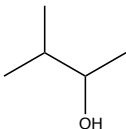
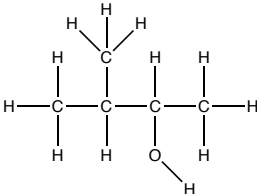
15	Structural formula	Skeletal formula	Displayed formula
	CH ₃ —CH ₂ —Br		
	Name		

16	Structural formula	Skeletal formula	Displayed formula
			
	Name		

17	Structural formula	Skeletal formula	Displayed formula
	$ \begin{array}{ccccc} & \text{Br} & & \text{Cl} & & \text{CH}_3 & & \\ & & & & & & & \\ \text{CH}_3 & - \text{C} & - & \text{CH} & - & \text{C} & - & \text{CH}_3 \\ & & & & & & & \\ & \text{Br} & & & & \text{Br} & & \end{array} $		
	Name		

18	Structural formula	Skeletal formula	Displayed formula
	$ \begin{array}{c} \text{Cl} \\ \\ \text{CH}_3 - \text{CH} - \text{CH} = \text{CH}_2 \end{array} $		
	Name		

ALCOHOLS

19	Structural formula	Skeletal formula	Name & comments
			Longest C chain that contains the OH functional group is 4C atoms – so it has a <i>but</i> stem. There is only one functional group (methyl is not a functional group), and to give the OH group the lowest number it is numbered from the right end, so it is <i>-2-ol</i>.
	Displayed formula		There is a methyl group on carbon-3, so it is <i>3-methyl</i>.
			3-methylbutan-2-ol

20	Structural formula	Skeletal formula	Name & comments
			Longest C chain that contains the OH functional group is 3C atoms – so it has a <i>prop</i> stem. There is only one functional group (methyl is not a functional group), and to give the OH group the lowest number it is numbered from the right end, so it is <i>-1-ol</i>.
	Displayed formula		There is a methyl group on carbon-2. However, the methyl does not need a number in the name because it could not be on any other C atom and still be <i>methylpropan-1-ol</i>. However, many people would still put this 2 on the methyl group as it is not that obvious that a number is not needed
			methylpropan-1-ol (2-methylpropan-1-ol)

	Structural formula	Skeletal formula	Displayed formula
21	$ \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{CH}_3 - \text{CH} - \text{CH} - \text{CH} - \text{CH}_2 - \text{CH}_3 \\ \\ \text{OH} \end{array} $		
	Name		

	Structural formula	Skeletal formula	Displayed formula
22	$ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_2 - \text{CH} - \text{CH} = \text{CH} - \text{CH}_3 \\ \\ \text{OH} \end{array} $		
	Name		

	Structural formula	Skeletal formula	Displayed formula
23	$ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH} - \text{OH} \\ \\ \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH}_3 \end{array} $		
	Name		

ALDEHYDES

24	Structural formula	Skeletal formula	Name & comments
			Longest C chain that contains the CHO aldehyde functional group is 4C atoms – so it has a <i>but</i> stem.
	Displayed formula		By definition, the aldehyde functional group is carbon-1 and so it does not need a number.
			As the chain is numbered from the right, the methyl group is on carbon-3 and so it is <i>3-methyl</i> . 3-methylbutanal

25	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3-\text{CH}_2-\text{C}-\text{H} \end{array}$		
	Name		

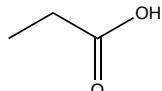
26	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{ccccccc} & \text{CH}_3 & & & \text{O} & & \\ & & & & & & \\ \text{CH}_3 - & \text{C} & - & \text{CH} & - & \text{CH}_2 & - \text{C} - \text{H} \\ & & & & & & \\ & \text{Br} & & \text{Br} & & & \end{array}$		
	Name		

KETONES

27	Structural formula	Skeletal formula	Name & comments
			Longest C chain that contains the CO ketone functional group is 5C atoms – so it is has a <i>pent</i> stem.
	Displayed formula		There is only one functional group which is the ketone group (methyl is not a functional group). If the chain is numbered from the left, the ketone group is on carbon-4, but if it is numbered from the right it is carbon-2. Therefore we number from the right and it is <i>-2-one</i> .
			There is a methyl group on carbon-4 and so it is <i>4-methyl</i> . 4-methylpentan-2-one

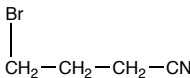
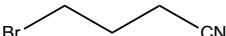
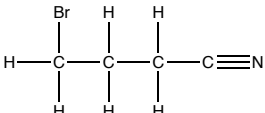
28	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3-\text{CH}_2-\text{C}-\text{CH}_3 \end{array}$		
	Name		

CARBOXYLIC ACIDS

29	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$		Longest C chain that contains the COOH carboxylic acid functional group is 3C atoms – so it is has a <i>prop</i> stem.
	Displayed formula		By definition, the carboxylic acid functional group is carbon-1 and so it does not need a number.
	$\begin{array}{c} \text{H} & \text{H} & \text{O} \\ & & \\ \text{H}-\text{C} & -\text{C}- & \text{C}-\text{O}-\text{H} \\ & & \\ \text{H} & \text{H} & \end{array}$		propanoic acid

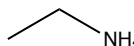
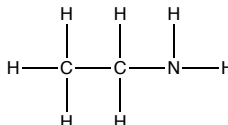
30	Structural formula	Skeletal formula	Displayed formula
	Name		

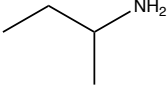
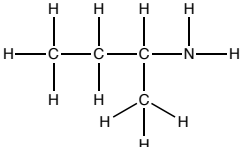
NITRILES

31	Structural formula	Skeletal formula	Name & comments
			There are two functional groups, the –Br and the –CN. By definition, the nitrile functional group –CN is carbon-1 and so it does not need a number. This means that the Br is on carbon-4, so is <i>4-bromo</i>.
	Displayed formula		Note that the longest C chain containing the nitrile group has 4 C atoms, including the C of the nitrile group.
			4-bromobutanenitrile

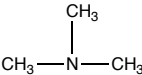
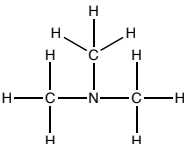
32	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_2-\text{CN} \end{array}$		
	Name		

AMINES

33	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\text{NH}_2$		The naming of amines can be complicated and you are likely to see different names. The IUPAC rules for amines are not well known or used.
	Displayed formula		This is a very simple amine with one alkyl group bonded to the N (a primary amine).
			The group bonded to the N is an ethyl group. It can be thought of as <i>ethane</i> but with an amine group in place of an H. ethanamine <i>ethylamine or aminoethane also used</i>

34	Structural formula	Skeletal formula	Name & comments
	$\begin{array}{c} \text{CH}_3-\text{CH}_2-\text{CH}-\text{NH}_2 \\ \\ \text{CH}_3 \end{array}$		This molecule can be thought of as <i>butane</i> with an amine group on carbon-2. The amine group does need a number because it could also be on carbon-1. butan-2-amine <i>1-methylpropylamine</i> or <i>2-aminobutane</i> also used
	Displayed formula		
			

35	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{NH}-\text{CH}_3$		In this molecule, there are two alkyl groups bonded to the N and so it is a secondary amine. This molecule can be thought of as <i>propanamine</i> with a methyl group also bonded to the N. In order to show that it is bonded to the N rather than one of the C atoms in the propyl group, it is labelled <i>N-methyl</i>.
	Displayed formula		N-methylpropan-1-amine
			<i>N-methylpropylamine</i> also used

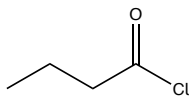
36	Structural formula	Skeletal formula	Name & comments
			In this molecule, there are three alkyl groups bonded to the N and so it is a tertiary amine. This is nearly always called <i>trimethylamine</i>, but it is not the official IUPAC name. It is effectively <i>methanamine</i> with two methyl groups on the N.
	Displayed formula		N,N-dimethylmethanamine <i>trimethylamine</i> usually used
			

37	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}-\text{NH}_2 \end{array}$		
	Name		

38	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}-\text{NH}-\text{CH}_3 \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$		
	Name		

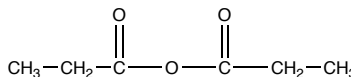
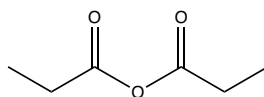
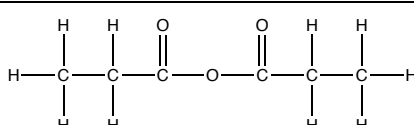
39	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{N}-\text{CH}_3 \end{array}$		
	Name		

ACYL CHLORIDE

40	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{Cl}$		The acyl chloride group is by definition on carbon-1 and so no number is needed. The longest chain is 4 C atoms long, so it is a <i>but</i> .
	Displayed formula		butanoyl chloride
	$\begin{array}{ccccccc} & \text{H} & & \text{H} & & \text{H} & & \text{O} \\ & & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - & \text{C} - \text{Cl} \\ & & & & & & & \\ & \text{H} & & \text{H} & & \text{H} & & \end{array}$		

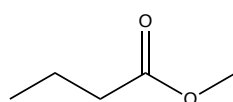
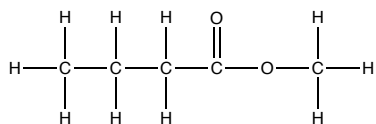
41	Structural formula	Skeletal formula	Displayed formula
	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3-\text{CH}_2-\text{C}-\text{Cl} \end{array}$		
	Name		

ACID ANHYDRIDE

42	Structural formula	Skeletal formula	Name & comments
			Acid anhydrides are symmetrical about the middle oxygen (you could make acid anhydrides that are not, but there is no real use for them).
	Displayed formula		The C chain length stem comes from the number of C atoms in the chain on each side of the central O. In this case, there are 3 C atoms on each side and so the stem is <i>prop</i> .
			propanoic anhydride

43	Structural formula	Skeletal formula	Displayed formula
			
	Name		

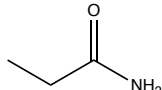
ESTERS

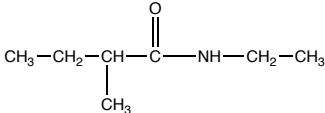
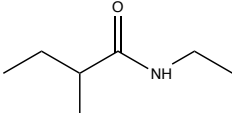
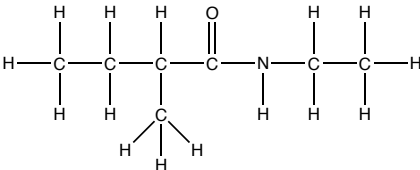
44	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_3$		There are two parts to the name. Esters can be thought of as being similar to carboxylic acids but with an alkyl group on the O instead of an H. This ester could be thought of as <i>butanoic acid</i> with a methyl group in place of the H on the O.
	Displayed formula		
			
			The part of the molecule that is like <i>butanoic acid</i> without the H is <i>butanoate</i>. This <i>butanoate</i> has a <i>methyl</i> group attached. methyl butanoate

45	Structural formula	Skeletal formula	Displayed formula
	$\text{CH}_3-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_2-\text{CH}_3$		
	Name		

46	Structural formula	Skeletal formula	Displayed formula
	$\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_2-\text{CH}_3$		
	Name		

AMIDES

47	Structural formula	Skeletal formula	Name & comments
	$\text{CH}_3-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$		The longest chain containing the amide functional group is 3 C atoms long, and so the stem is <i>prop</i> . The amide group is carbon-1 by definition and so no number is needed for it. propanamide
	Displayed formula		
	$\begin{array}{ccccccc} & \text{H} & & \text{H} & & \text{O} & \\ & & & & & & \\ \text{H} & -\text{C} & - & \text{C} & - & \text{C} & -\text{N}-\text{H} \\ & & & & & & \\ & \text{H} & & \text{H} & & & \text{H} \end{array}$		

48	Structural formula	Skeletal formula	Name & comments
			The longest chain containing the amide functional group is 4 C atoms long, and so the stem is <i>but</i>. The amide group is carbon-1 by definition and so no number is needed for it. There is a methyl group on the main C chain. It could be on different C atoms and so needs a number. As the C of the amide group is carbon-1 by definition, the methyl group is on carbon-2 and so is <i>2-methyl</i>. There is an ethyl group on the N of the amide group. In order to show that this is on the N and not on a C atom, it is written as <i>N-ethyl</i>. In alphabetical order, the ethyl comes before the methyl. N-ethyl-2-methylbutanamide
	Displayed formula		
			

49	Structural formula	Skeletal formula	Displayed formula
	$\text{CH}_3-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}-\text{CH}_3$		
	Name		

50	Structural formula	Skeletal formula	Displayed formula
	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$		
	Name		

CYCLIC COMPOUNDS

Note - it is normal to draw skeletal (or sometimes displayed) formulas for cyclic compounds – it is quite hard to draw anything else

51	Displayed formula	Skeletal formula	Name & comments
			This is a cyclic alkane (there is no functional group). It has 5 C atoms in the ring. cyclopentane

52	Displayed formula	Skeletal formula	Name & comments
			This is a cyclic molecule with 6 C atoms in the ring, and so is <i>cyclohex</i>. There are two bromo functional groups. They could be on different C atoms on the ring and so numbers are needed. We take the first Br atom to be on carbon-1, and so the other Br atom is on carbon-3 going clockwise (or carbon-4 anticlockwise, but we go the way that gives the lowest number). 1,3-dibromocyclohexane

53	Displayed formula	Skeletal formula	Name & comments
			This is a cyclic molecule with 6 C atoms in the ring, and so is <i>cyclohex</i>. There is a ketone functional group. It does not need a number as it is the only group on the ring. cyclohexanone

54	Displayed formula	Skeletal formula	Name

55	Displayed formula	Skeletal formula	Name

COMPOUNDS WITH SEVERAL FUNCTIONAL GROUPS

a) More than one of the same functional group

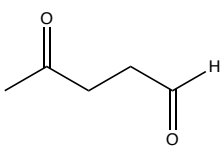
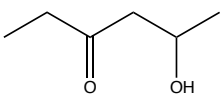
	Structural formula	Name
alkenes	$\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_2-\text{CH}=\text{CH}_2$	hexa-1,4-diene
halogenoalkanes	$\begin{array}{c} \text{Br} \quad \text{Br} \\ \quad \\ \text{CH}_3-\text{CH}-\text{CH}-\text{CH}_2-\text{CH}_3 \end{array}$	2,3-dibromopentane
alcohols	$\begin{array}{c} \text{OH} \quad \text{OH} \\ \quad \\ \text{CH}_2-\text{CH}_2-\text{CH}_2 \end{array}$	propane-1,3-diol
aldehydes	$\begin{array}{c} \text{O} \quad \text{O} \\ \quad \\ \text{H}-\text{C}-\text{CH}_2-\text{CH}_2-\text{C}-\text{H} \end{array}$	butanedial
ketones	$\begin{array}{c} \text{O} \quad \text{O} \\ \quad \\ \text{CH}_3-\text{C}-\text{CH}_2-\text{C}-\text{CH}_3 \end{array}$	pentane-2,4-dione
carboxylic acids	$\begin{array}{c} \text{O} \quad \text{O} \\ \quad \\ \text{HO}-\text{C}-\text{CH}_2-\text{C}-\text{OH} \end{array}$	propanedioic acid
nitrile	$\text{NC}-\text{CH}_2-\text{CH}_2-\text{CN}$	butanedinitrile
amine	$\text{H}_2\text{N}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{NH}_2$	propane-1,3-diamine
acyl chloride	$\begin{array}{c} \text{O} \quad \text{O} \\ \quad \\ \text{Cl}-\text{C}-\text{CH}_2-\text{C}-\text{Cl} \end{array}$	propanedioyl dichloride
amide	$\begin{array}{c} \text{O} \quad \text{O} \\ \quad \\ \text{H}_2\text{N}-\text{C}-\text{CH}_2-\text{C}-\text{NH}_2 \end{array}$	propanediamide

b) Different functional groups

- In terms of numbering the chain, there is an order of priorities with the highest priority groups taking the lowest number – you are not generally expected to know this order as an A level student, but it is useful to be aware of it – some common groups are shown here:

carboxylic acid > nitrile > aldehyde > ketone > alcohol > amine > alkene > halogenoalkane

- If there are two groups that have suffixes, then the lower priority group becomes a prefix.

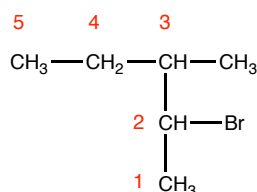
	Structural formula	Skeletal structure	Name & comments
56	$\begin{array}{c} \text{O} \quad \text{O} \\ \quad \\ \text{CH}_3-\text{C}-\text{CH}_2-\text{CH}_2-\text{C}-\text{H} \end{array}$		This has an aldehyde group and a ketone group. The aldehyde group takes priority and so is carbon-1. The ketone group is therefore carbon-4 and will be the prefix <i>4-oxo</i> 4-oxopentanal
57	$\begin{array}{c} \text{O} \quad \text{OH} \\ \quad \\ \text{CH}_3-\text{CH}_2-\text{C}-\text{CH}_2-\text{CH}-\text{CH}_3 \end{array}$		This has a ketone group and an alcohol group. The ketone group takes priority and so is carbon-3. The alcohol group is therefore carbon-5 and will be the prefix <i>5-hydroxy</i> 5-hydroxypentan-3-one

	Structural formula	Skeletal structure	Name & comments
58	$\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_2-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$		This has an alkene group and an alcohol group. The alcohol group takes priority and so is carbon-2 with suffix <i>-2-ol</i> . The alkene group is therefore carbon-4. hex-4-en-2-ol

	Structural formula	Skeletal structure	Name
59	$\text{H}_2\text{N}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$		

	Structural formula	Skeletal structure	Name
60	$\begin{array}{c} \text{Br} \quad \quad \text{O} \\ \quad \quad \parallel \\ \text{CH}_3-\text{CH}-\text{CH}-\text{C}-\text{CH}_3 \\ \\ \text{Br} \end{array}$		

Some more examples for extra guidance

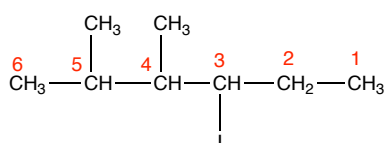


2-bromo-3-methylpentane

In this molecule, the longest C chain that contains the functional group has 5 C atoms (and so the name has *pent* in it.)

In order to give the functional group (bromo, *Br*) the lowest number, the C chain is numbered from the end shown. This makes it *2-bromo* rather than *4-bromo*.

There is also a *methyl* group on carbon-3 making it *3-methyl*. When writing the name, we put the *2-bromo* before the *3-methyl* the as *b* comes before *m* in the alphabet.



3-iodo-4,5-dimethylhexane

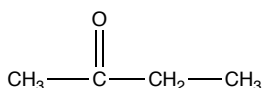
In this molecule, the longest C chain that contains the functional group has 6 C atoms (and so the name has *hex* in it.)

In order to give the functional group (iodo, *I*) the lowest number, the C chain is numbered from the right hand end. This makes it *3-iodo* rather than *4-iodo*.

There are also two *methyl* groups, on carbon-4 and carbon-5, making it *4,5-dimethyl*.

When writing the name, we put the *3-iodo* before the *4,5-dimethyl* the as *i* comes before *m* in the alphabet (we ignore the *di* in the dimethyl when doing this).

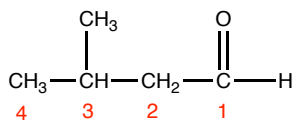
Note that the we would get a lower set of numbers if this was numbered from the other end, but we have to number the C chain to give the functional group the lowest number(s), and the only functional group here is the iodo group (methyl and any other alkyl groups are not functional groups).



butanone

In this molecule, the longest C chain that contains the functional group has 4 C atoms (and so the name has **but** in it.)

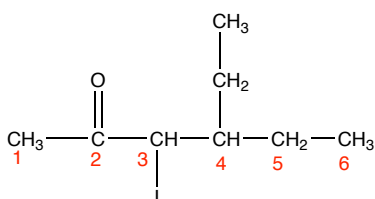
There is a ketone group (**C=O**) and so it has **-one** at the end. No number is needed for the ketone group because it can only be on one of the two central C atoms (otherwise it would be an aldehyde and not a ketone) and whichever of the two central C atoms it is, it would be carbon-2 and so no number is necessary.



3-methylbutanal

In this molecule, the longest C chain that contains the functional group has 4 C atoms (and so the name has **but** in it.)

The aldehyde group (**CHO**) is by definition carbon-1 and so the name has **al** at the end (note that no number is needed as the C in an aldehyde is on carbon-1 by definition). This means that the methyl group is on carbon-3 and is **3-methyl**.



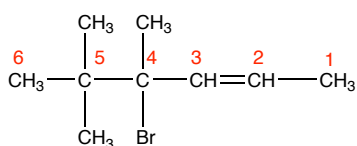
4-ethyl-3-iodohexan-2-one

In this molecule, the longest C chain that contains the functional group has 6 C atoms (and so the name has **hex** in it.)

There are two functional group (**C=O** and **I**). We number it from the end to give the ketone group the lowest number (as ketone groups have higher priority than halo groups). Therefore we number it from the left making it **2-one** and **3-iodo**.

There is also one **ethyl** group on carbon-4, making it **4-ethyl**.

When writing the name, we put the **4-ethyl** before the **3-iodo** the as e comes before i in the alphabet.



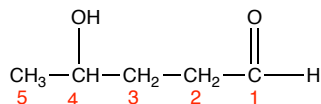
4-bromo-4,5,5-trimethylhex-2-ene

In this molecule, the longest C chain that contains the functional group has 6 C atoms (and so the name has **hex** in it.)

There are two functional group (alkene **C=C** and bromo **Br**). We number it from the end to give the alkene group the lowest number (as alkene groups have higher priority than halo groups). Therefore we number it from the right making it **2-ene** and **4-bromo**.

There are also three **methyl** groups, two on carbon-5 and one on carbon-4, making it **4,5,5-trimethyl**.

When writing the name, we put the **4-bromo** before the **4,5,5-trimethyl** the as b comes before m (ignore the tri) in the alphabet.



4-hydroxypentanal

In this molecule, the longest C chain that contains the functional group has 5 C atoms (and so the name has **pent** in it.)

There are two functional groups (alcohol **OH** and aldehyde **CHO**). By definition, the aldehyde group is carbon-1 and so the alcohol group is carbon-4. (and aldehyde groups are higher priority than alcohol groups anyway)

Usually, these functional groups both are written as endings (ol and al). The aldehyde group is higher priority and so we use **al**, and so we use the prefix **4-hydroxy** for the alcohol.