Naming Organic Compounds

- Because there are several million organic compounds known, scientists have developed an unambiguous system for naming them (the IUPAC system), although some compounds are often referred to by their common (trivial) names.

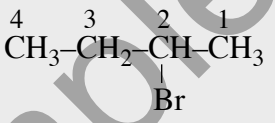
  e.g. CH_3COOH is commonly called acetic acid, although its systematic name is ethanoic acid.

  Systematic names are built around a stem which identifies the basic carbon skeleton. Prefixes and suffixes are used to identify the functional groups present. The naming of the carbon skeleton is based on the names of the alkanes. The number of carbon atoms in the longest continuous chain is indicated by the prefix to the alkane – see table below.

Number of carbons	Alkane name	Prefix
1	methane	meth-
2	ethane	eth-
3	propane	prop-
4	butane	but-
5	pentane	pent-
6	hexane	hex-
7	heptane	hept-
8	octane	oct-
9	nonane	non-
10	decane	dec-

- A system of numbering is used to identify where a functional group or alkyl group (carbon chain) is attached to the carbon skeleton.

  e.g. Consider 2-bromobutane:



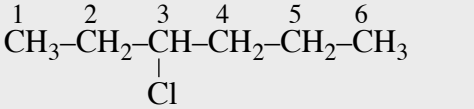
  The '-ane'indicates that the skeleton is saturated.
  The 'but-' indicates that there are 4 carbon atoms in the longest continuous chain.
  The 'bromo-' indicates that a bromine atom is present.
  The '2-' indicates that the bromine atom is attached to the second carbon atom of the chain.

- **The IUPAC system of nomenclature**

  The basic naming system is summarised as follows:

  1. Select the longest continuous chain of carbon atoms and name according to the parent alkane.
  2. Number the C atoms in the chain to indicate the positions of any substituents in the chain. Number the chain in such a way as to give the substitutent(s) the lowest value:

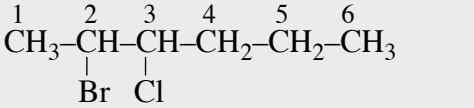
e.g.



3-chlorohexane

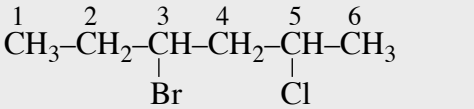
  3. The names and positions of substitution of any substituents must prefix the name of the parent alkane alphabetically.

e.g.



2-bromo-3-chlorohexane

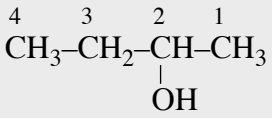
and



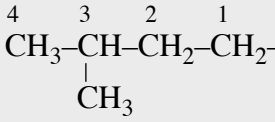
3-bromo-5-chlorohexane
(**not** 2-chloro-4-bromohexane)

4. Assign numbers to functional groups so that they are as small as possible. These numbers are placed between the stem and the ending of the name. The position number of the functional group overrules numbers assigned to alkyl groups.

e.g. Consider the naming of the following alcohols:



butan-2-ol (parent alkane butane)

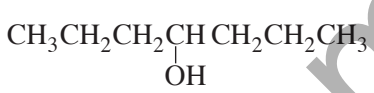
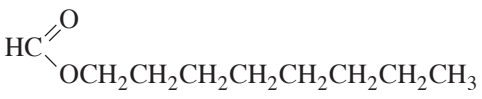


3-methylbutan-1-ol (parent alkane, butane)

- In Year 12 you learnt about alkanes, alkenes, alkynes, haloalkenes, alcohols, carboxylic acids and esters. You learnt to recognise their functional groups and how to name these classes of compound. As you work through this section you will learn about five new classes of compound, namely amines, aldehydes, ketones, acyl chlorides and amides. The following exercise will help you to revise what you learnt last year about recognising functional groups and naming organic compounds.

Exercise Naming Organic Compounds

1. Complete the following table. The first one has been done for you.

STRUCTURAL FORMULA	CLASSIFICATION	NAME
$CH_3CH_2CH_2CH{=}CH_2$	alkene	pent-1-ene
		
		3-bromopentane
$CH_3CH_2CH_2CH_2COOH$		
		4-ethyl-2-methylhexane
		
$CH_3CH_2CH_2C{\equiv}CCH_2CH_3$		