

Name: _____

Date: _____

AQA A-LEVEL CHEMISTRY

Nomenclature: Naming Organic Compounds

Learn Pack

Guided notes, worked examples and practice questions to be completed alongside the lesson.

WATCH THE LESSON

Introduction

Organic compounds often have multiple common names. For example, ethanoic acid may also be called:

- Acetic acid
- Vinegar
- Ethylic acid

Lesson Objectives:

- Name organic compounds using IUPAC rules.
- Identify functional groups and apply priority rules correctly.
- Interpret and construct structural formulae from IUPAC names.

To avoid ambiguity, chemists use a standard system called IUPAC.

IUPAC stands for:

International Union of Pure and Applied Chemistry

To achieve this, IUPAC names are built from the structure of the molecule itself — starting from the main carbon framework and then adding information about what is attached to it and where those groups are located.

What is the main purpose of the IUPAC naming system?

The name of any compound should clearly describe its structure

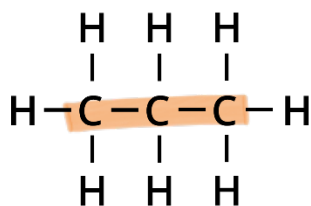
Step One: The Stem

Count the number of carbon atoms in the longest continuous chain that contains the functional group, this gives you the stem.

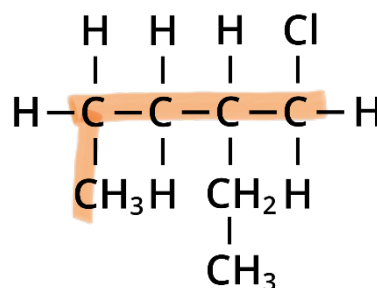
Complete the table below:

No. of Carbon Atoms	1	2	3	4	5	6
Stem	meth	eth	prop	but	pent	hex

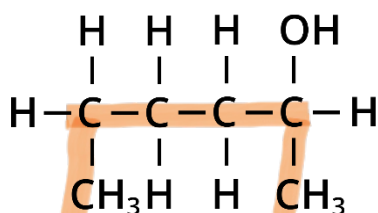
Determine the stem of the following compounds:



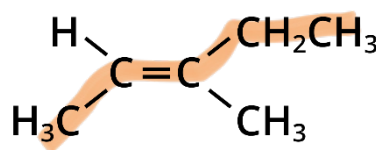
prop



pent



hex



pent

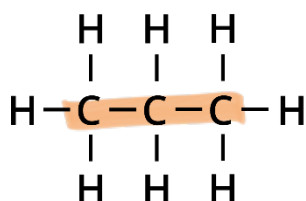
Step Two: Functional Groups

Identify the main functional group of the molecule, this gives you the prefix/suffix.

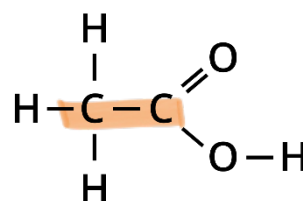
Determining functional groups is important because the functional group:

- Determines how the molecule behaves chemically
- Identifies the homologous series the compound belongs to

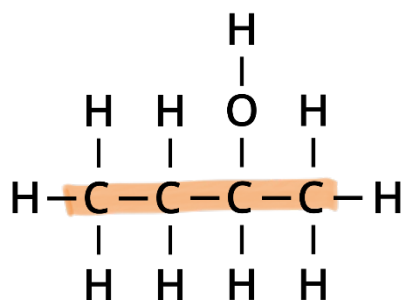
Determine the stem and prefix/suffix of the following compounds:



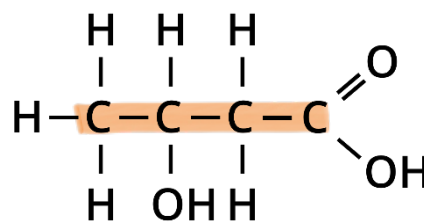
propane



ethanoic acid



butanol

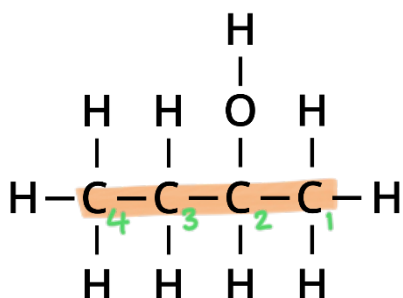


butanoic acid

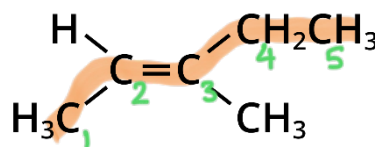
Step Three: Locants

Number the carbon atoms in the longest chain so that the carbon with the main functional group attached has the lowest possible number, this will give you the numbers for your locants.

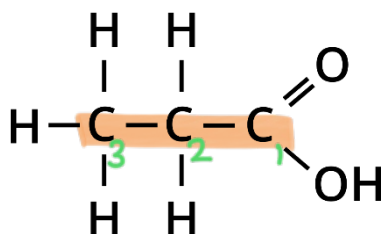
Determine the stem and prefix/suffix of the following compounds, giving the locant of the main functional group where necessary:



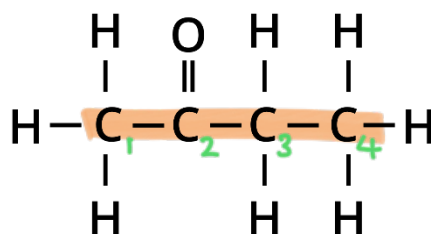
butan-2-ol



pent-2-ene



propanoic acid

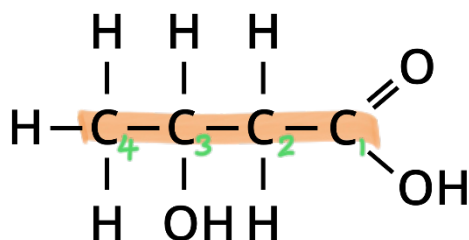


butanone

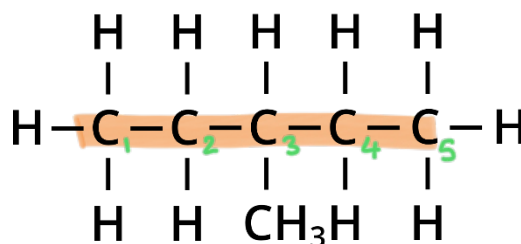
Step Four: Prefixes

Identify any side chains or lower priority functional groups; add these as prefixes putting them in alphabetical order, with the locant number.

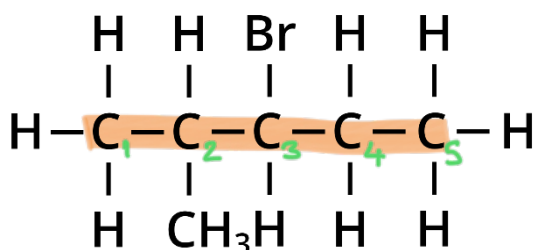
Determine the stem and prefix/suffix of the following compounds, give the locant of the main functional group and any additional groups or side chains where necessary:



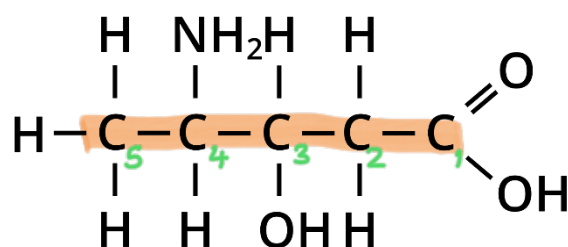
3-hydroxybutanoic acid



3-methylpentane



3-bromo-2-methylpentane

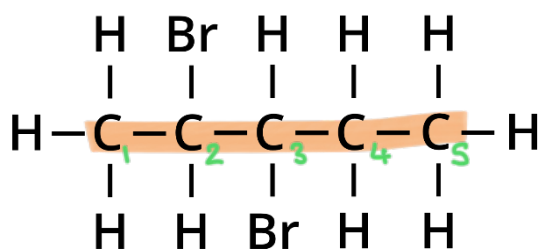


4-amino-3-hydroxypentanoic acid

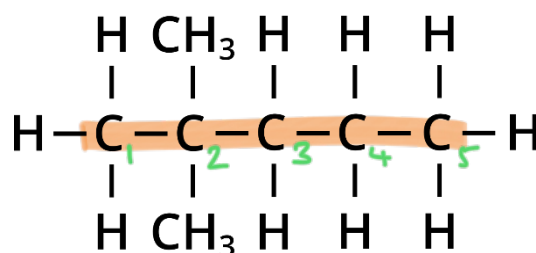
Step Five: Identical Groups

If there's more than one identical side-chain or functional group use di- (2), tri- (3) or tetra- (4) before that part of the name.

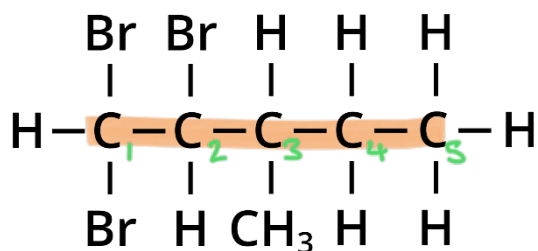
Determine the full IUPAC names of the following compounds:



2,3-dimethylpentane



2,2-dimethylpentane



1,1,2-tribromo-3-methylpentane

Steps Summary

Step 1: Identify the longest continuous chain containing the main functional group.

Step 2: Identify highest priority functional group .

Step 3: Number chain to give lowest possible numbers .

Step 4: Add side chains and lower priority groups as prefixes in alphabetical order.

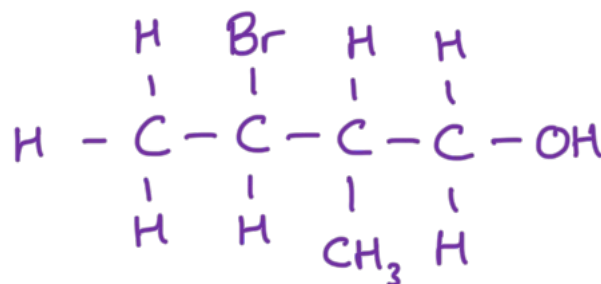
Step 5: Use di-, tri-, tetra- for identical side chains or groups.

Drawing Named Compounds

Since the IUPAC name contains structural information, it is also possible to work backwards from the name to draw the molecule:

1. Start with the stem of the name and determine the length of the main chain.
2. Use the suffix to identify the main functional group and attach it to the appropriate carbon as indicated by the locant number.
3. Work through the prefixes adding side chains or lower priority functional groups to the carbon atoms as specified by their locants.

Draw the structure of 3-bromo-2-methylbutan-1-ol below:



Practise Questions – Fact Recall

1. Put the following functional groups in order of priority, from highest to lowest: Alkene, Alcohol, Ketone, Carboxylic Acid?

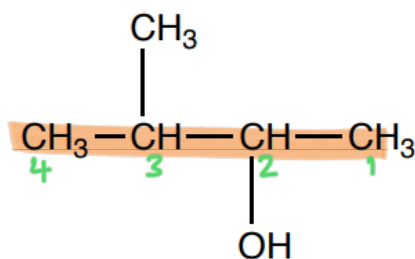
Carboxylic acid, ketone, alcohol

2. If there are two bromine atoms attached to the carbon chain, what prefix should you add to bromo- when naming the molecule?

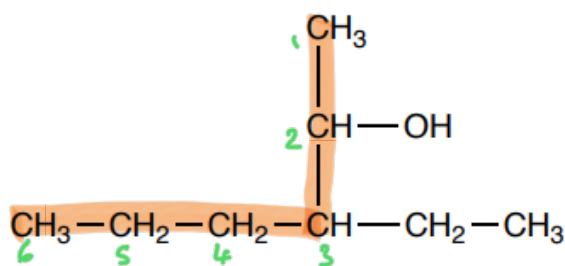
di

Practise Questions – Application

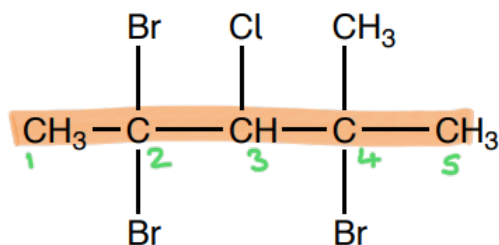
1. Name the following compounds:



3-methylbutan-2-ol



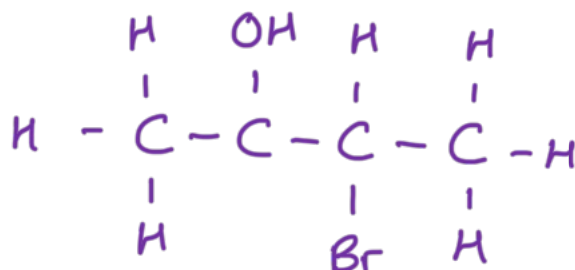
3-ethylhexan-2-ol



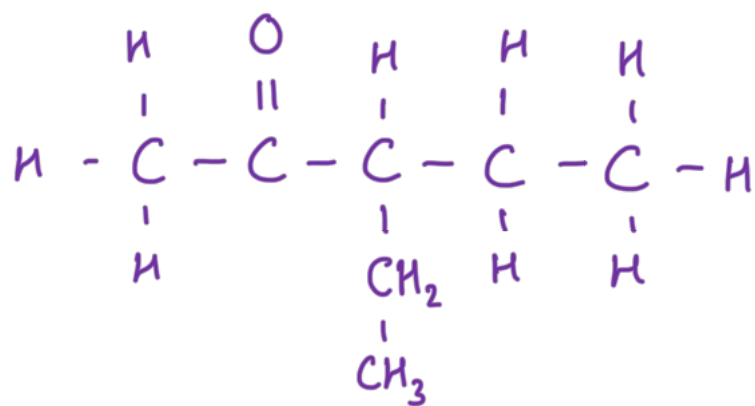
2,2,4-tribromo-3-chloro-4-methylpentane

2. Draw a structural formula for the following compounds:

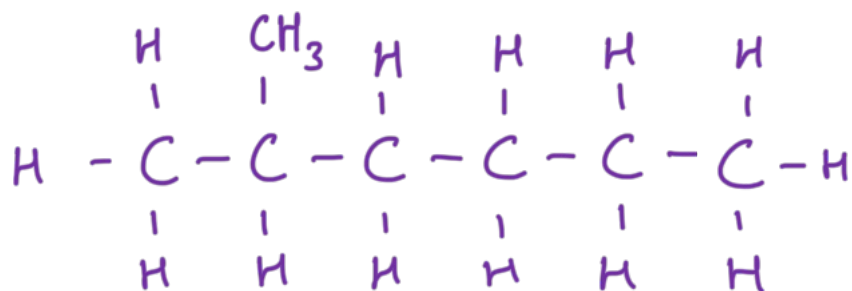
a) 3-bromobutan-2-ol



b) 3-ethylpentan-2-one



c) 2-methylhexane



d) 1,3-difluorobut-2-ene

