



Which of the above formulae gives the most information about the molecule? What extra information does it give over the other three?

· What does a line show in a shortened structural formula?

▲ **What to do...** Complete part 2 of the "Naming Alkanes" cut-out-sheet.

▲ Notes

Your notes on **shortened structural formulae** should include your completed cut-out-sheet and any important points raised in your discussion.

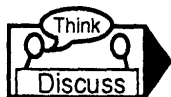
3. Traditional And Systematic Naming

Many organic compounds have traditional names which give no clue about their formulae or structures. For example the traditional name for the alkanes was the paraffins.

▲ What to do...

1. Collect a box of model atoms and a data booklet.
2. Build a model of 2-methylpropane and use the data booklet to find its traditional name.

	boiling point
iso-butane	256 K (-8° C)
iso-octane	372 K (99° C)



· 2-Methylpropane boils at 265 K (- 8° C). Is this closer to the boiling point of propane or butane? (Use a data booklet to find these.)

· Compare the traditional and systematic names and your model. Where does the traditional name come from? (Clue: Molecular formula.)

▲ What to do...

Build a model of 2,2,4-trimethylpentane and find its traditional name. Compare your model and its properties with pentane and octane.

▲ Notes

Your notes on traditional and systematic naming should include:

- the traditional name for the alkanes.
- and systematic names, full structural formulae and shortened structural formulae for iso-butane and the traditional iso-octane.

(You may wish to present this information in the form of a table.)

NAMING ALKANES

In this consolidation topic you can refresh your memory on chemical nomenclature and particular the following key aspects:

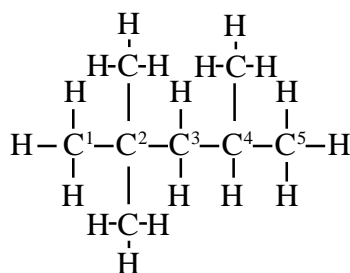
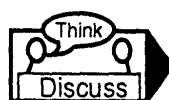
- the I U P A C rules for the naming of hydrocarbon molecules.

- how to draw full structural and shortened structural formulae for named molecules.

- the interchange of systematic and trivial nomenclature using a data book.

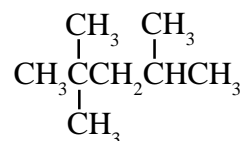
☞ You should read through your original notes, paying particular attention to the key aspects listed above.

■ Now use a data booklet to help you **think** your way through the following discussion questions.



The I U P A C systematic name for this structural formula is: **2,2,4-trimethylpentane**

- ☛ What do the letters I U P A C stand for?
- ☛ How does the 'pentane' part of the name come about?
- ☛ Which part of the molecule is called 'methyl' and why is this so?
- ☛ What does the prefix 'tri-' signify?
- ☛ What do the numbers 2,2,4 correspond with?
- ☛ What is the molecular formula for this hydrocarbon?



Structural formulae can be shortened to a more convenient form. The carbon to carbon bonds are only shown at the point of branching.

☛ What is the systematic name for this hydrocarbon?

In industry the systematic name is not always used and an older traditional name may be retained although it does not always give any idea of the structure of the molecule.

☛ Use the data booklet to find the traditional name of the compound you have been dealing with. How do you think this name came about?

▲ Notes

In your consolidation report for **naming alkanes** you should give the full structural formula, the shortened structural formula, the molecular formula, the systematic name and the traditional name for the compound above and for isobutane.

☛ You should be able to:

1. Say what is meant by the initials I.U.P.A.C.
2. Use a set of naming rules to name straight and branched chain alkanes and to draw structures from systematic names.
3. Interpret molecular formulae, full structural formulae and shortened structural formulae for alkanes.
4. Convert a shortened structural formula into a full structural formula and vice versa.
5. Use traditional and systematic names for some alkanes and relate them to their properties.

CHECK TEST Check that you have now mastered this topic by trying the check test on the next page.

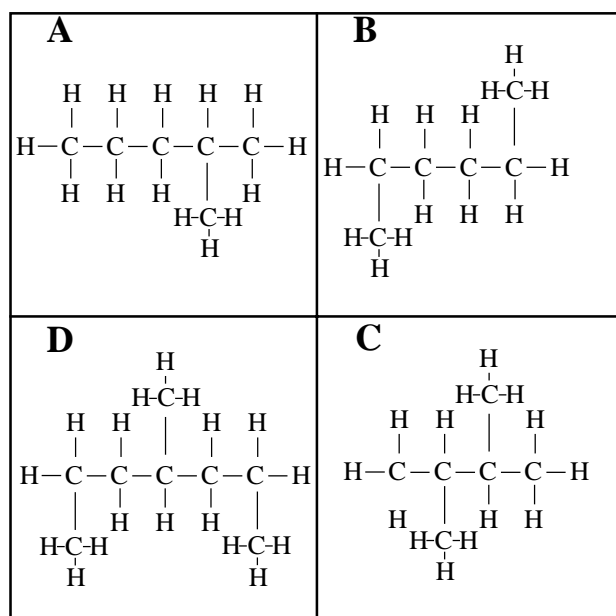
CHECK TEST

1. The initials I. U. P. A. C. stand for
 A International Union of Physics and Chemistry.
 B International Union of Physicists and Chemists.
 C International Union of Pure and Applied

Chemists.

D International Union of Pure and Applied Chemistry.

► Questions 2,3 and 4 refer to the compounds below.

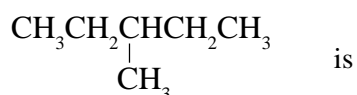


2. Which of the above has a hydrocarbon with 6 carbons in its longest chain?

3. Which of the above is a straight chain hydrocarbon?

4. Which of the above is 2-methylpentane?

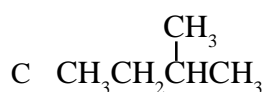
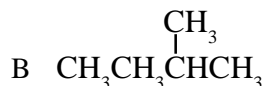
5. The systematic name for the alkane



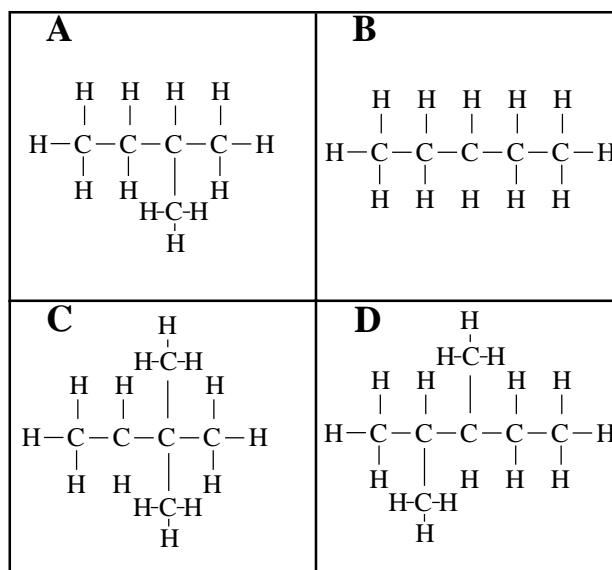
- A hexane.
 B 4-methylhexane.
 C 4-ethylbutane.
 D 3-methylpentane.

6. The alkane

has the shortened structural formula



► Questions 7, 8 and 9 refer to the compounds below.



7. Which compound has the formula C₆H₁₄?

8. Which is an isomer of the compound B?

9. Which could be isopentane?

10. The boiling point of pentane is 309 K (36°C). What is the most likely boiling point for isopentane?

- A 135 K (-138°C)
 B 231 K (-42°C)
 C 301 K (28°C)
 D 359 K (86°C)