

## Knowledge check

Subject area: Organic chemistry

Level: 14–16 years (Higher)

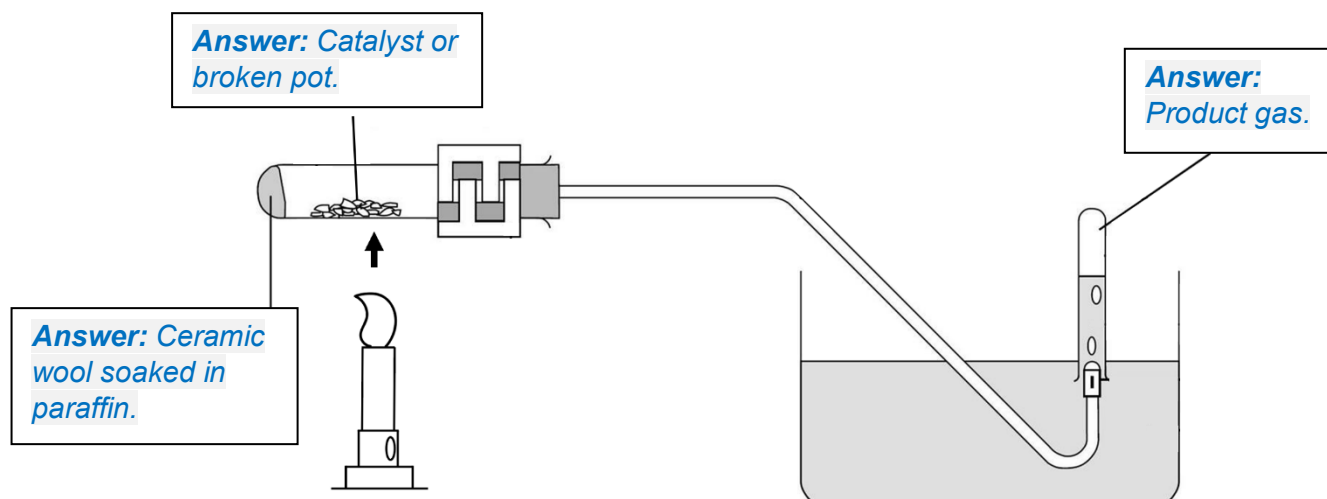
Topic: Cracking hydrocarbons

Source: [rsc.li/2SCxbLL](https://www.rsc.li/2SCxbLL)

**1. Ashley and Diane carry out an experiment to crack some liquid paraffin.**

Liquid paraffin is a mixture of straight chain alkane hydrocarbons containing between 5 and 15 carbon atoms in each molecule.

Their equipment is shown below.



**a) Label the diagram by filling in the boxes.**

*See answers above.*

**b) Which of the following statements are true or false about this experiment?**

Write your answers into the box as 'T' for true, or 'F' for false.

- |      |  |                                |
|------|--|--------------------------------|
| i)   | A molecule of formula $C_6H_{12}$ could be present in the liquid paraffin. | <input type="text" value="F"/> |
| ii)  | A catalyst is added to increase the rate or speed of reaction              | <input type="text" value="T"/> |
| iii) | The paraffin solidifies during the experiment.                             | <input type="text" value="F"/> |
| iv)  | The product gas contains smaller molecules than those in the paraffin oil. | <input type="text" value="T"/> |
| v)   | A Bunsen burner is used to decompose hydrocarbon molecules.                | <input type="text" value="T"/> |
| vi)  | A molecule of formula $C_2H_4$ could be present in the product gas.        | <input type="text" value="T"/> |
| vii) | The process taking place is exothermic.                                    | <input type="text" value="F"/> |

**2. The following sentences are about cracking as an industrial process.**

Which of the following statements are true or false about this process?  
Write your answers into the box as 'T' for true, or 'F' for false.

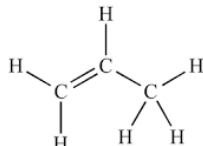
a) Cracking is carried out because longer chain hydrocarbons are less useful.

b) During cracking, smaller alkanes are made that are used for making polymers.

c) When decane is cracked, a molecule with molecular formula  $C_{12}H_{24}$  could be formed.

d) During cracking, alkenes are formed, and these contain only carbon single bonds.

e) The molecule below is an alkene called propane:



f) There are two types of cracking – thermal cracking and catalytic cracking.

3. a) Complete the following equations that show hydrocarbons being cracked.

- i) Hexane  $\rightarrow$  butane + ethene
- ii) Decane  $\rightarrow$  octane + ethene
- iii)  $C_{12}H_{26} \rightarrow C_{10}H_{22} + C_2H_4$  Alkane
- iv)  $C_{16}H_{34} \rightarrow C_{13}H_{28} + C_3H_6$  Alkane
- v)  $C_{10}H_{22} \rightarrow C_6H_{14} + 2C_2H_4$  Alkene
- vi)  $C_{22}H_{46} \rightarrow C_{19}H_{38} + C_3H_6 + H_2$  Alkene

b) State whether the hydrocarbon answers to parts iii) to vi) are alkanes or alkenes.

Assume that all hydrocarbons are straight or branched chain hydrocarbons.

*Answers: See above for answers, in right-hand column.*