Knowledge check

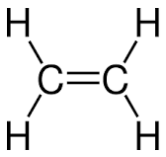
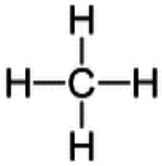
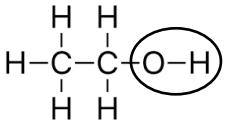
Subject area: Organic chemistry | **Level: 14–16 years (Higher)**

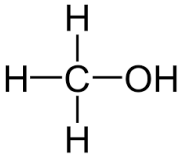
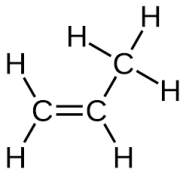
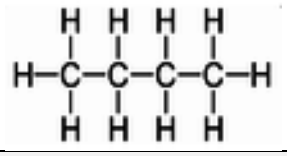
Topic: Alcohols | **Source: rsc.li/3ntOcpM**

1. These six molecules include alkanes, alkenes and alcohols.

a) State which molecules belong to which group.

Write your answer underneath each molecular structure.

		
Answer: *Alkene: ethene.*	***Answer:*** *Alkane: methane.*	***Answer:*** *Alcohol: ethanol.*

		
Answer: *Alcohol: methanol.*	***Answer:*** *Alkene: propene.*	***Answer:*** *Alkane: butane.*

b) Name each of the substances in part a).

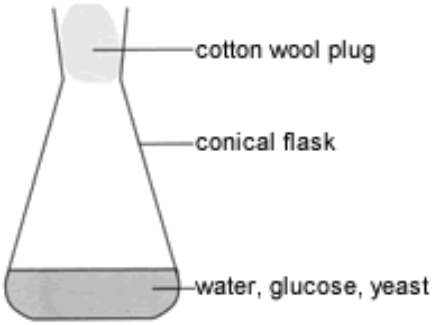
Answer: *See answers above.*

c) Using one of the molecules shown, circle the alcohol functional group.

Answer: *See diagram of ethanol in which the O-H (hydroxyl) group is circled.*

2. Janice and Matt set up this equipment then waited for one week.

A chemical reaction takes place in which new substances are made.



a) Complete the word equation for this reaction:

Glucose → *ethanol* + carbon dioxide

b) Complete the symbol equation for the reaction.

$C_6H_{12}O_6(aq) \rightarrow 2C_2H_5OH(aq) + 2CO_2(g)$

c) What is the name given to the type of reaction taking place?

Answer: *Fermentation.*

d) Explain why yeast is used in the experiment.

Answer: *Yeast contains an enzyme that makes the fermentation happen at a faster rate.*

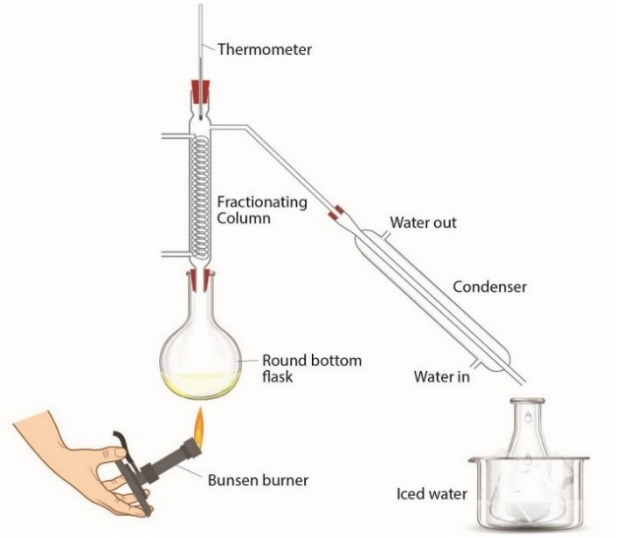
Janice and Matt then add the mixture from the conical flask to the round-bottom flask in a different experiment.

e) Why is this new experiment needed?

Answer: *To separate the ethanol from the aqueous solution.*

f) Explain how this experiment works.

Answer: *Ethanol has a lower boiling point than water, so is able to form a vapour that can be removed and condensed.*



Source: Royal Society of Chemistry

g) What is the name of this technique or experiment?

Answer: *Fractional distillation.*

h) Give two uses of alcohols.

Answer: *Solvent, fuel.*

3. Ravi carries out an experiment with a mixture of ethanol dissolved in water.

He leaves the ethanol open to the air for two weeks.
He notices that a very slow chemical reaction takes place.
He removes a few drops of his new mixture and adds some universal indicator solution.
He notices that the indicator turns orange.

a) What type of substance has formed?

Answer: *A weak acid.*

b) What is the name of the new organic product formed?

Answer: *Ethanoic acid.*

c) State the name of the chemical substance that reacts with ethanol in this reaction.

Answer: *Oxygen, from the air (in the presence of certain bacteria).*

d) What type of reaction has taken place?

Answer: *Oxidation.*

e) Ravi knows that a different chemical substance could be added to ethanol to make the same product, but a lot faster.

State the name of this substance.

Answer: *Acidified potassium manganate(VII) [OCR] or acidified potassium or sodium dichromate(VI) [AQA].*

f) Complete the chemical equation that shows the reaction taking place:

$C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$

g) Complete the diagram to show the structure of the new organic product made.