AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.7.2 REACTIONS OF ALKENES AND ALCOHOLS (PACK 2)

SCORE	PERCENTAGE
/36	%

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Q1.

Known crude oil reserves are being used up rapidly. Crude oil is used to produce many useful fuels, such as petrol. One way to conserve crude oil reserves would be to increase the production of bio-fuels.

(a) Ethanol can be produced for use as a bio-fuel. Cars can be powered by ethanol or ethanol–petrol mixtures.

Sugar cane can be fermented to give a mixture of water (boiling point 100 °C) and ethanol (boiling point 78 °C).

(i) How can ethanol be separated from water?

_____

_____

(1)

(ii) Ethanol, C_2H_5OH, burns to release heat energy.

Complete the balanced symbol equation by writing in the formulae of the two products.

C_2H_5OH + $3O_2$ 2_____ + 3_____

(2)

(b) The cost of producing a bio-fuel, such as ethanol, by fermentation, is at least three times higher than the production cost of petrol. It costs less to produce ethanol from alkanes. In the production, the vapour of an alkane is passed over a hot catalyst.

$$\underset{\text{hexane}}{C_6H_{14}} \xrightarrow{\text{Hot catalyst}} \underset{\text{ethane}}{C_2H_6} + \underset{\text{ethene}}{2C_2H_4}$$

Ethene is then converted into ethanol.

(i) What has happened to the hexane to produce ethene?

_____

(1)

(ii) Complete the structural formula for ethene, C_2H_4.

C C

(1)

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(iii) Name the compound that is added to ethene to produce ethanol, C_2H_5OH.

_____

(1)

(c) As explained in parts (a) and (b), ethanol can be made using either sugar or alkanes as the starting material.

Evaluate the advantages and disadvantages of using these two starting materials to produce ethanol.

_____

_____

_____

_____

_____

_____

_____

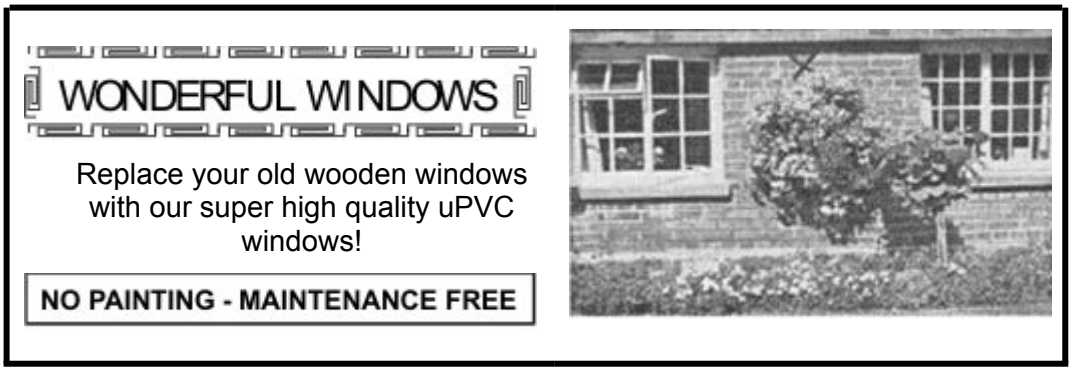
_____

(4)

(Total 10 marks)

Q2.

Modem window frames are often made from uPVC which contains the plastic poly(chloroethene).



(a) State why plastic window frames need no painting or maintenance.

_____

_____

(1)

(b) Poly(chloroethene) is a polymer formed by the *addition polymerisation* of chloroethene.

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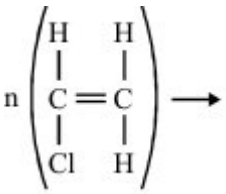
(i) Chloroethene is an unsaturated molecule. Why is this molecule said to be unsaturated?

_____

_____

(1)

(ii) Complete the diagram to represent how poly(chloroethene) is formed from chloroethene.



(3)

(iii) Explain what is meant by the term *polymerisation*.

_____

_____

_____

_____

(2)

(iv) Why is this an *addition polymerisation*?

_____

_____

(1)

(Total 8 marks)

Q3.

(a) Alkenes can be made by cracking large alkane molecules.

(i) Explain how the cracking process is carried out.

_____

_____

_____

_____

(2)

(ii) Give a chemical test which would show the difference between an alkene and an alkane.

Test _____

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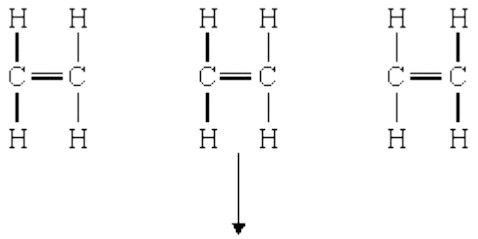
Result of test _____

_____

(2)

(b) Alkenes, such as ethene, can be made into polymers.

(i) Complete the following to show how the ethene molecules bond to form part of a polymer.



(1)

(ii) Name the polymer formed from ethene.

_____

(1)

(iii) Explain **one** important problem caused by the everyday use of this polymer.

_____

_____

_____

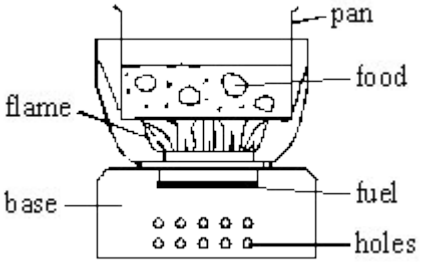
(2)

(Total 8 marks)

Q4.

The diagram below shows a camping stove used by some students.

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A student wrote the report below to explain how the stove works. The report has had some words removed. Complete the report using words from the list.

air	chemical change	liquids	physical change
argon	gases	nitrogen	solid
carbon dioxide	heat energy	oxygen	water vapour

To use the stove a fuel called methylated spirits is poured into the burner and lit with a match.

The holes in the base let _____ into the stove. This contains the gas called

_____ which is needed for the fuel to burn.

When the fuel burns, new substances are formed. This shows that a _____

takes place.

When all of the methylated spirits has burned nothing is left in the burner. This shows that

the new substances must all be _____ .

Methylated spirits contains carbon and hydrogen. When the fuel burns the carbon is changed

into _____ .

The hydrogen is changed into _____ .

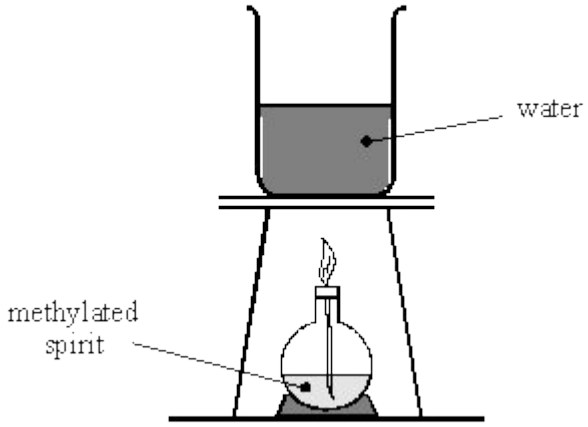
When the fuel burns it gives out _____ which cooks the food in the pan.

(Total 7 marks)

Q5.

A student is using a spirit burner to heat some water.

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(a) Complete these sentences.

Substances like methylated spirit which we burn to give out energy, are called

_____ . The energy is given out as _____ energy.

(2)

(b) Choose a word from this list to complete the sentence below.

gases **liquids** **solids**

The methylated spirit seems to disappear as it burns.

The new substances produced during burning are mainly _____.

(1)

(Total 3 marks)

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