ORGANIC REVISION

June 10 04

Leave blank

4. Crude oil is a mixture of many different compounds.

(a) During industrial refining, crude oil is first separated into fractions.

(i) What is the name of the process used to obtain fractions from crude oil?

.....

(1)

(ii) Describe how the fractions are obtained.

.....

.....

.....

.....

.....

.....

(4)

(b) Four of the fractions obtained from crude oil are:

bitumen
diesel
gasoline
kerosene

(i) Which of these four fractions is the most viscous?

.....

(1)

(ii) Which of these four fractions is the most volatile?

.....

(1)

(iii) Which of these four fractions is used in making roads?

.....

(1)

(iv) Name two other fractions obtained from crude oil.

1 .....

2 .....

(2)

Leave blank

(c) Octane is a hydrocarbon in the gasoline fraction.

Write the names of the substances in the word equation for the complete combustion of octane.

octane + ... → ..... + ...

(3)

(d) Octane belongs to a homologous series called the alkanes.
One characteristic of a homologous series is that each member of the series has the same general formula.

(i) What is the general formula of the alkanes?

.....

(1)

(ii) State two other characteristics of a homologous series.

1 .....

.....

2 .....

.....

(2) **Q4**

(Total 16 marks)

TOTAL FOR SECTION A: 45 MARKS

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Q11 Leave blank

2. The sequence shows the steps that can be used to obtain ethanol from crude oil.

crude oil $\xrightarrow{\text{Step 1}}$ diesel $\xrightarrow{\text{Step 2}}$ ethene $\xrightarrow{\text{Step 3}}$ ethanol

(a) Step 1 is fractional distillation, which takes place in a fractionating column. Crude oil vapour is pumped in just above the bottom of the column.

(i) Describe how the fractions are separated in the fractionating column.

.....

.....

.....

.....

(2)

(ii) Explain why the hydrocarbons in the fuel oil fraction are obtained from the column below the hydrocarbons in the diesel fraction.

.....

.....

.....

.....

(2)

(iii) One of the hydrocarbons in the diesel fraction has the formula $C_{16}H_{34}$. Suggest the formula of a hydrocarbon found in the gasoline fraction.

.....

(1)

(iv) Name the fraction that is more viscous than fuel oil.

.....

(1)

Leave blank

(b) Step 2 is cracking, which is carried out by heating the diesel fraction with a catalyst.

(i) During cracking, one molecule of $C_{16}H_{34}$ is converted into one molecule of ethene and one molecule of hydrocarbon **X**.
State the formula of **X**.

.....

.....

(1)

(ii) Describe, in terms of the bonds broken and formed, what happens during cracking.

.....

.....

(2)

(c) Step 3 is hydration, which is carried out by heating ethene and steam at a temperature of about 300 °C and a pressure of about 65 atm.

(i) Identify one other condition used in Step 3.

.....

(1)

(ii) Write a chemical equation for the reaction occurring in Step 3.

.....

.....

(2)

ORGANIC REVISION

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Q2

Leave blank

0 3

Propanone and water are both covalently bonded compounds. The table shows their boiling points.

Compound	Boiling point (°C)
propanone	56
water	100

(a) Some anhydrous copper(II) sulphate was added to a mixture of propanone and water. What colour change would be seen?

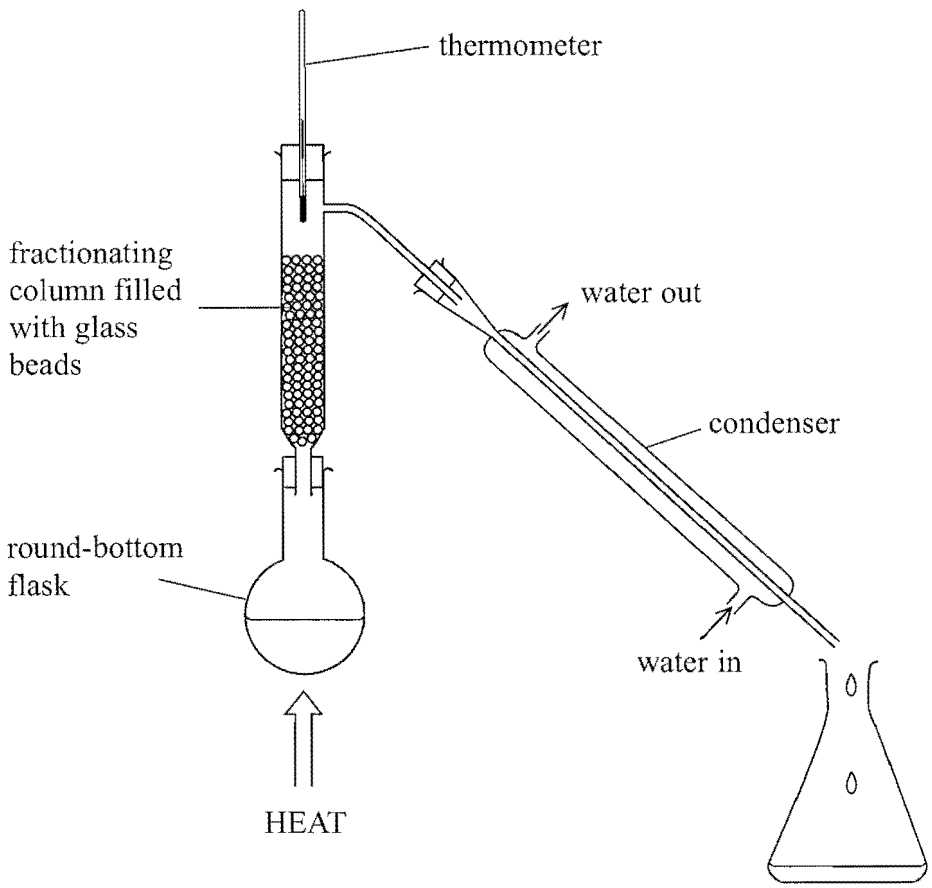
Analysis

Colour at start .....

Colour at end .....

(2)

(b) Propanone can be obtained from a mixture of propanone and water using the apparatus shown.



(i) Name the method of separation carried out using this apparatus.

.....

(2)

Leave blank

(ii) Why can propanone and water be separated by this method?

.....

(1)

(iii) Outline how a sample of pure propanone can be obtained from the mixture.

.....

.....

.....

.....

.....

(3)

(c) Propanone and water both have simple molecular structures. They have low boiling points. Place a cross (☒) in **one** box from **each** column of statements to explain why they have low boiling points.

(Structure - Extraction)

the covalent bonds between their atoms are strong	☐		
the covalent bonds between their atoms are weak	☐		
		AND	
the attractive forces between their molecules are strong	☐		these require a lot of energy to be overcome ☐
the attractive forces between their molecules are weak	☐		these require little energy to be overcome ☐
			these get weaker as the temperature increases ☐

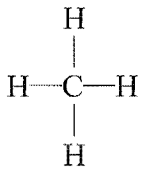
(2) Q2

(Total 10 marks)

ORGANIC JUN 09 Q3

Leave blank

4. Methane, CH_4, is an organic compound. It is the first member of an homologous series of **saturated hydrocarbons**.
The displayed formula of methane is



(a) What is meant by the term **hydrocarbon**?

.....

.....

.....

(2)

(b) What is meant by the term **saturated**?

.....

.....

(1)

(c) Name the homologous series of which methane is the first member.

.....

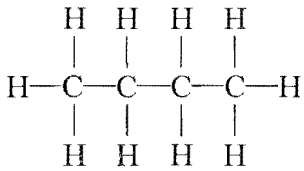
(1)

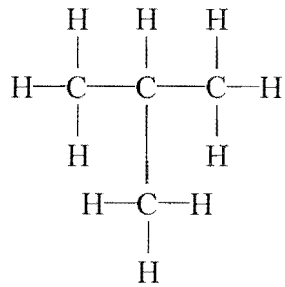
(d) Draw the displayed formula of the second member of this homologous series.

(2)

Leave blank

(e) The displayed formulae of two other organic compounds are





(i) What is the molecular formula of these two compounds?

.....

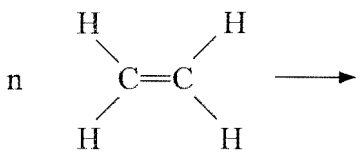
(1)

(ii) What name is given to compounds that have the same molecular formula but different displayed formulae?

.....

(1)

(f) Some other organic compounds are used to make polymers.
Poly(ethene) is an addition polymer made from many identical monomer molecules.
Complete the following equation to show the formation of poly(ethene).



(2)

(g) Nylon is another example of a polymer.

(i) What type of polymer is nylon?

.....

(1)

(ii) Put a cross (☒) in the **two** boxes to show the types of monomers used in the manufacture of nylon.

alcohol ☐

alkene ☐

diamine ☐

dicarboxylic acid ☐

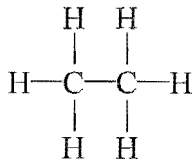
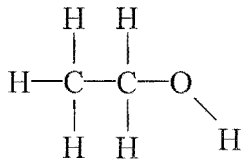
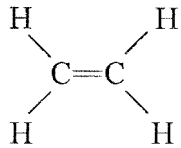
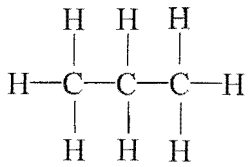
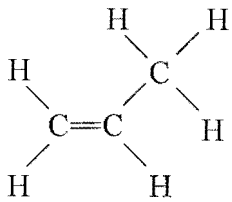
(2)

Q3

(Total 13 marks)

Leave blank

5 (a) The table shows the displayed formulae of some organic compounds.

Compound	Displayed formula
A	
B	
C	
D	
E	

(i) Give one reason why compound **B** is not a hydrocarbon.

.....

(1)

(ii) State the empirical formula of compound **A**.

.....

(1)

(iii) Both **A** and **D** are members of the same homologous series.
What is a homologous series?

.....

.....

.....

(2)

Leave blank

(iv) Draw a dot and cross diagram to show the bonding in compound **A**.

(2)

(v) What is the name of the addition polymer formed by compound **E**?

.....

(1)

(vi) Draw the repeat unit of the addition polymer of compound **E**.

(2)

(vii) Compound **E** reacts rapidly with bromine water but the addition polymer of compound **E** does not. Explain this difference in behaviour.

.....

.....

.....

(2)

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Leave blank

(b) Draw the displayed formulae of three isomers with molecular formula C_4H_8.

(3) **Q8**

Organic

June 10 Q7

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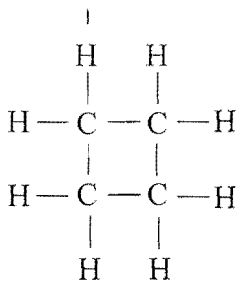
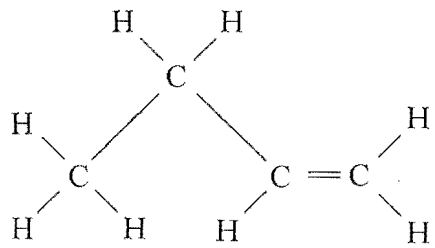
6 **A** and **B** are two hydrocarbons with the molecular formula C_4H_8.
Their structures are:



A



B

(a) Describe a chemical test to distinguish between hydrocarbons **A** and **B**.
Give the result you would expect for each hydrocarbon.

Test .....

Result with **A** .....

Result with **B** .....

(3)

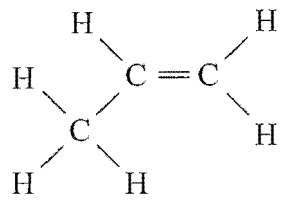
(b) To which homologous series does **B** belong?

.....

(1)

Leave blank

(c) Hydrocarbon **C** belongs to the same homologous series as **B**. It has the structure:



C

C forms an addition polymer. Draw the repeat unit of this polymer.

(2)

(d) Give the name of the addition polymer formed by **C**.

.....

(1) **Q7**

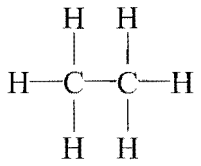
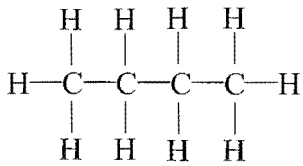
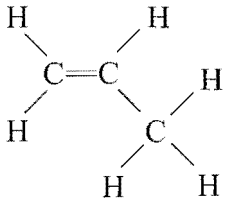
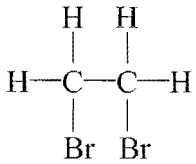
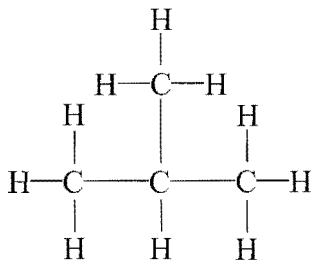
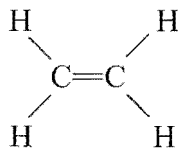
(Total 7 marks)

~~Structure~~ ~~Ext~~ Organic Nov 09

Q5

Leave blank

7 The table shows the structures of some organic compounds.

 **A**	 **B**
 **C**	 **D**
 **E**	 **F**

(a) Explain why compound **C** is not a saturated hydrocarbon.

.....

.....

(1)

(b) Explain why compound **D** is not a hydrocarbon.

.....

.....

(1)

(c) Give the letters of two compounds that are isomers of each other.

.....

(1)

Leave blank

(d) Give the letters of two compounds that are members of the same homologous series but have different molecular formulae.

.....

(1)

(e) Name and give the general formula of the homologous series to which compound **E** belongs.

Name of homologous series .....

General formula .....

(2)

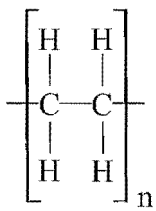
(f) What colour change is seen when bromine water is added to compound **F**?

.....

.....

(2)

(g) A polymer has the structure:



(i) Give the letter of the monomer which is used to make this polymer.

.....

(1)

(ii) Give the name of the polymer.

.....

(1)

(iii) What type of polymer is this?

.....

(1) Q5

(Total 11 marks)

TOTAL FOR SECTION A: 45 MARKS

Leave blank

SECTION B

8 Alkenes are unsaturated hydrocarbons.

(a) State the general formula of all alkenes.

.....

(1)

(b) Draw the displayed formula of ethene.

(1)

(c) Alkenes can be shown to be unsaturated using bromine water. Describe the colour change that occurs when an alkene reacts with bromine water.

.....

.....

(2)

(d) Ethene is the starting material in the following sequence of reactions.

ethene —Reaction **1**→ ethanol —Reaction **2**→ ethanoic acid

(i) State the other reagent, the catalyst, and one other condition used in Reaction **1**.

Reagent .....

Catalyst .....

Condition .....

(3)

Leave blank

9. Ethene can be converted to ~~ethyl ethanoate~~ ethanol as follows:

ethene ⟶ ethanol
CH_3CH_2OH

(a) In industry, ethene is converted to ethanol by reacting it with steam in the presence of a catalyst.

(i) Write the chemical equation for this reaction.

.....

.....

(1)

(ii) Name the catalyst used.

.....

(1)

(b) Ethanol can also be made by fermentation. Describe how this is done.

.....

.....

.....

.....

.....

.....

(4)