



UNIVERSITY *of* CAMBRIDGE  
International Examinations

**Script D**  
**Without Marks**

**Chemistry**  
**0620/03**

June 2003



UNIVERSITY *of* CAMBRIDGE  
Local Examinations Syndicate

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**International General Certificate of Secondary Education**

**CHEMISTRY**

**0620/03**

**Paper 3**

**May/June 2003**

**1 hour 15 minutes**

Candidates answer on the Question Paper.  
No Additional Materials required.

**READ THESE INSTRUCTIONS FIRST**

Write your name, Centre number and candidate number in the spaces provided at the top of this page.  
Write in dark blue or black pen in the spaces provided on the Question Paper.  
You may use a pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

The number of marks is given in brackets [ ] at the end of each question or part question.  
A copy of the Periodic Table is provided on page 12.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
2	
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4	
5	
TOTAL	

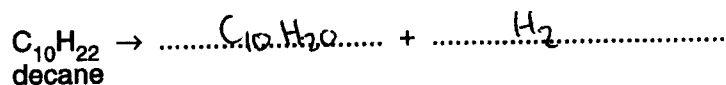
This document consists of 12 printed pages.



3 Alkenes are unsaturated hydrocarbons. They undergo addition reactions.

(a) Two of the methods of making alkenes are cracking and the thermal decomposition of chloroalkanes.

(i) Complete an equation for the cracking of the alkane, decane.



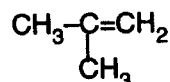
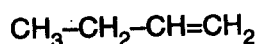
(ii) Propene can be made by the thermal decomposition of chloropropane. Describe how chloropropane can be made from propane.

reagents propane and water

conditions heat and catalyst

[4]

(b) The following alkenes are isomers.



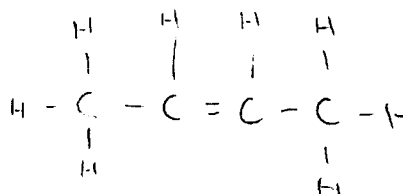
(i) Explain why they are isomers.

Because they have the same number of formula,  
but the positions are not in the diagram is not the  
same.

(ii) Give the name and structural formula of another hydrocarbon that is isomeric with the above.

name 2-butene ~~2-methyl propane~~  
but-2-ene.

structural formula



[4]

(c) Give the name of the product when but-1-ene reacts with each of the following.

steam ..... butane .....

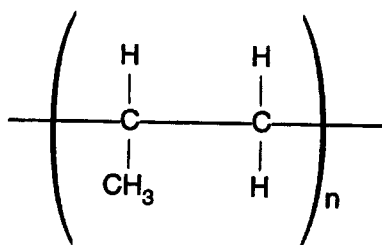
hydrogen ..... ~~hydro butane~~ hydro butane .....

bromine ..... ~~bromo butane~~ bromobutane .....

[3]

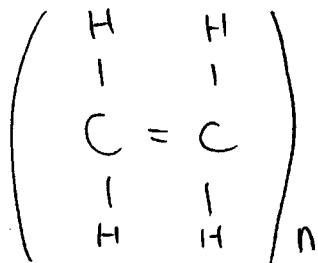
(d) Alkenes can polymerise.

(i) Deduce the name and structural formula of the monomer from the structure of the polymer.

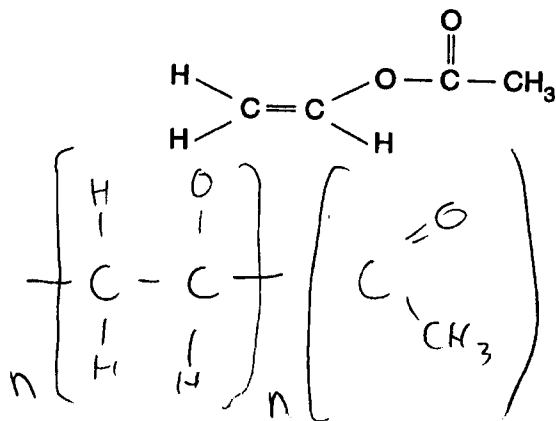


name of monomer ..... ethene .....

structural formula



(ii) Draw the structure of the polymer formed from the following monomer.



- (iii) Describe the pollution problems caused by the disposal of polymers in landfill sites and by burning.

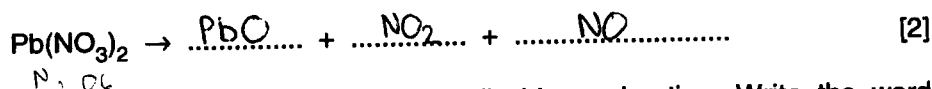
landfill sites The polymers won't be destroyed, they will stay there. [2]

burning They will turn to a poisonous gas [1]

4 Nitrogen dioxide,  $\text{NO}_2$ , is a dark brown gas.

- (a) Most metal nitrates decompose when heated to form the metal oxide, nitrogen dioxide and oxygen.

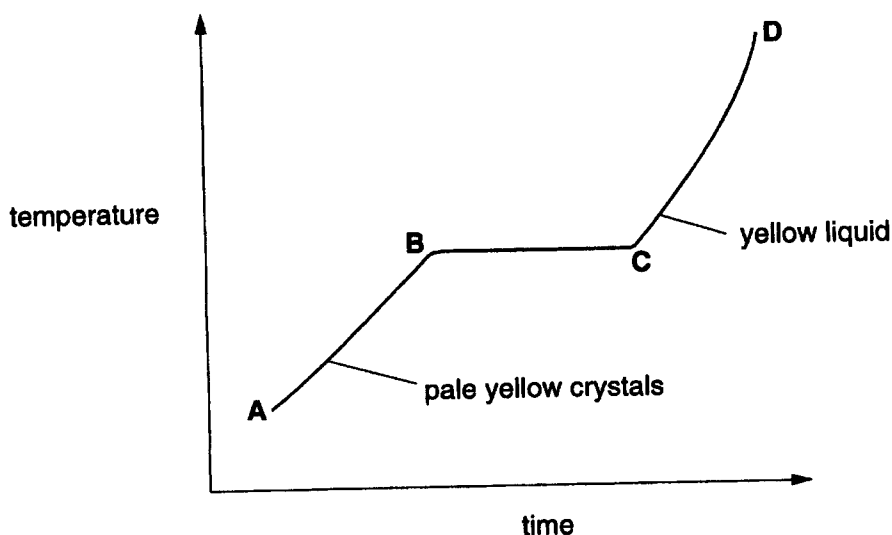
- (i) Write a symbol equation for the decomposition of lead(II) nitrate.



- (ii) Potassium nitrate does not form nitrogen dioxide on heating. Write the word equation for its decomposition.

~~K(NO<sub>3</sub>)~~ Potassium nitrate → Potassium oxide + nitrogen monoxide [1]

- (b) When nitrogen dioxide is cooled, it forms a yellow liquid and then pale yellow crystals. These crystals are heated and the temperature is measured every minute. The following graph can be drawn.



- (i) Describe the arrangement and movement of the molecules in the region A-B.

The molecules start to gain more energy, so they will vibrate faster and faster until the bonds between them start to break.

- (ii) Name the change that occurs in the region B-C

Melting.....[4]

- (c) Nitrogen dioxide and other oxides of nitrogen are formed in car engines.

- (i) Explain how these oxides are formed.

They are formed by the exhaust inside the engine, when the petrol burning inside at high temp. ~~to~~

- (ii) How are they removed from the exhaust gases?

~~By~~ reduced by oxygen in the engine.....[4]

- (d) Nitrogen dioxide, oxygen and water react to form dilute nitric acid.

Describe how lead(II) nitrate crystals could be prepared from dilute nitric acid and lead(II) oxide.

Lead(II) oxide would be put into dilute nitric acid and the reaction would occur to become lead(II) nitrate and oxygen will be given off.....[3]