



UNIVERSITY *of* CAMBRIDGE
International Examinations

Script C
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	
3	
4	
5	
TOTAL	

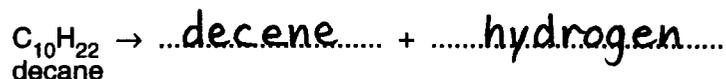
This document consists of 12 printed pages.



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.

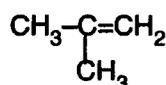
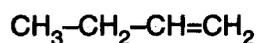


(ii) Propene can be made by the thermal decomposition of chloropropane. Describe how chloropropane can be made from propane.

reagents propane and ...chlorine...

conditions ...UV light... and ...high temperature [4]

(b) The following alkenes are isomers.



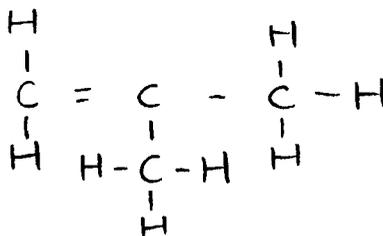
(i) Explain why they are isomers.

...They are isomers because they have same molecular formula but different structure...

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

name ...but-1-ene...

structural formula



[4]

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

steambutanol.....

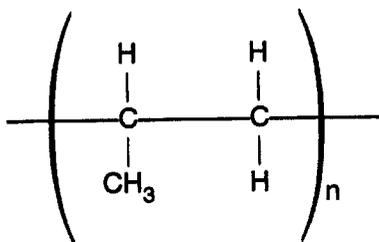
hydrogenbutane.....

brominedibromobutane.....

[3]

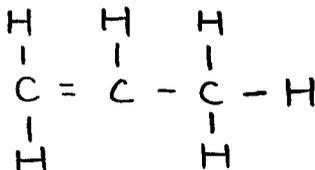
(d) Alkenes can polymerise.

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

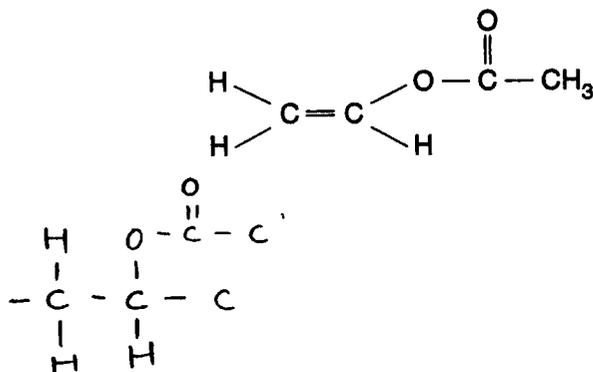


name of monomerpropene.....

structural formula



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



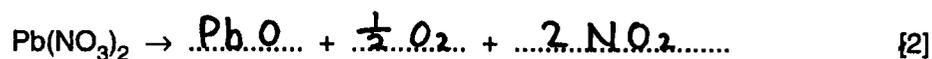
- (iii) Describe the pollution problems caused by the disposal of polymers in landfill sites and by burning.

landfill sites polymers are non-biodegradable and hence
 they remain for millions of years, ^{destroying animals' habitat} [2]
 burning burning polymers produces ^{harmful} toxic gas
 such as hydrogen chloride [1]

4 Nitrogen dioxide, NO_2 , is a dark brown gas.

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

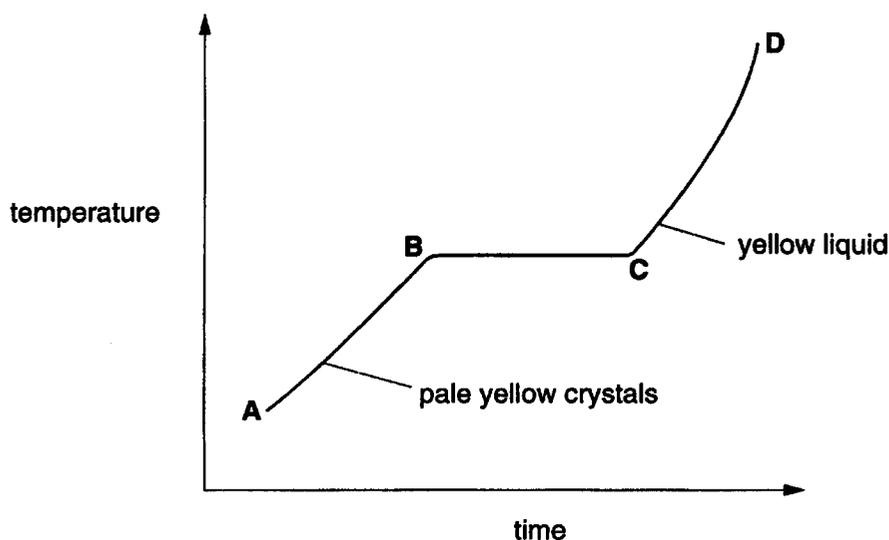
- (i) Write a symbol equation for the decomposition of lead(II) nitrate.



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

Potassium nitrate ^{Thermal decomposition} → Potassium nitrite + oxygen [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 are ~~arr~~ fixed in a regular arrangement called lattice, and they only vibrate about and ~~do~~ do not move from place to place.

- (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.

..These oxides are formed when nitrogen and oxygen from air react in car engines at a very high temperature.

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

..They are filtered through catalytic converter so that they are converted to nitrogen and oxygen, which are harmless gases. [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.

..Use titration method. Dissolve lead (II) ^{oxide} ~~nitrate~~ in distilled water, in a conical flask and add phenolphthalein to it. Put dilute nitric acid in [3] burette. Add dilute nitric acid to lead (II) oxide until phenolphthalein turns from purple to colourless. Repeat this for several times and calculate the average volume of nitric acid added. Add the average volume of nitric acid to lead (II) oxide, without phenolphthalein. Heat the lead (II) nitrate solution to get rid of excess water and leave it for several days. Wash the crystal with distilled water and dry it with a filter paper.