UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

Joint Examination for the School Certification and General Certificate of Education Ordinary Level

CHEMISTRY 5070/1

PAPER 1 Multiple Choice

OCTOBER/NOVEMBER SESSION 2002

1 hour

Additional materials:
Multiple Choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers, **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

This question paper consists of 15 printed pages and 1 blank page.

[Turn over

1 Which property of a gas affects the rate at which it spreads throughout a laboratory?

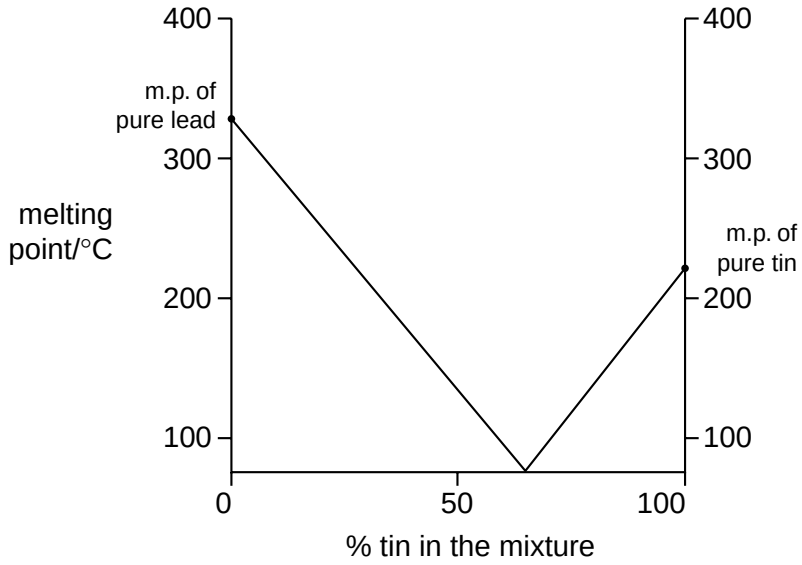
A boiling point

B molecular mass

C reactivity

D solubility in water

2 The graph gives the melting points of mixtures of lead and tin.



The graph shows that any mixture of lead and tin must have a melting point

A above that of tin.

B below that of lead.

C below that of both tin and lead.

D between that of tin and lead.

3 From which mixture can the underlined substance be obtained by adding water, stirring and filtering?

A <u>calcium carbonate</u> and sodium chloride

B copper(II) sulphate and <u>sodium chloride</u>

C <u>ethanoic acid</u> and ethanol

D iron and <u>magnesium</u>

4 An aqueous solution of a sulphate is made from a solid hydroxide, of a metal **M**, by the reaction:

$$M(OH)_2\,(s) + H_2SO_4(aq) \longrightarrow MSO_4(aq) + 2H_2O(l)$$

For which hydroxide would the method **not** work?

A barium hydroxide

B copper(II) hydroxide

C iron(II) hydroxide

D magnesium hydroxide

5 Which ion has the most shells that contain electrons?

A Al^{3+}

B Be^{2+}

C N^{3-}

D S^{2-}

6 The table gives data about four substances.

Which substance could be an ionic compound?

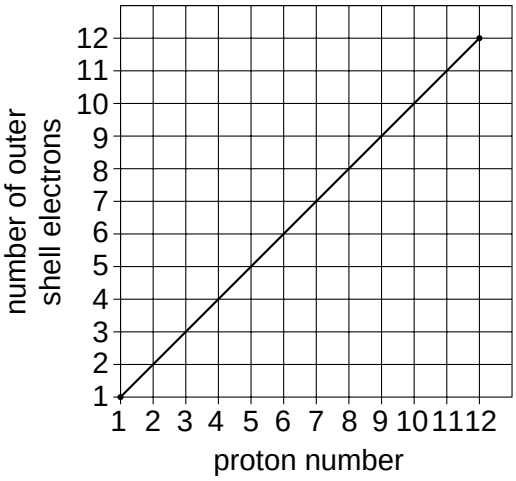
compound	melting point / °C	electrical conductivity in aqueous solution
A	–73	good
B	32	poor
C	474	poor
D	805	good

[Turn over

7 The number of outer shell electrons for the atoms of the first 12 elements in the Periodic Table is plotted against the proton number of the element.

Which graph is obtained?

A



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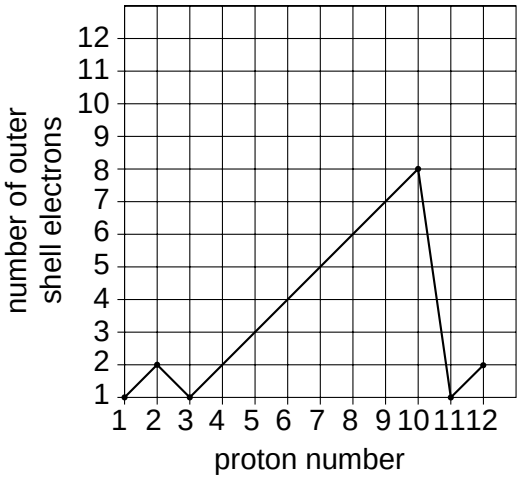

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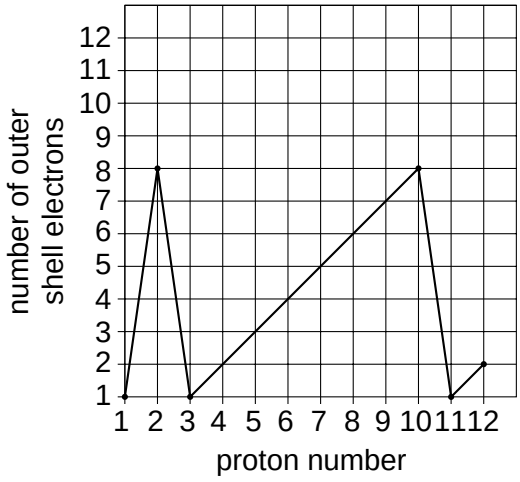
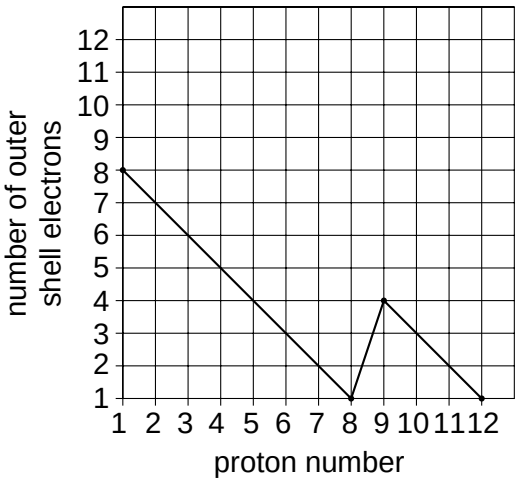


D



8 The table shows the electron structures of four elements.

element	electronic structure
W	2, 6
X	2, 8
Y	2, 8, 1
Z	2, 8, 7

Which pair of atoms will form a covalent substance?

A two atoms of **W**

B two atoms of **X**

C an atom of **W** and an atom of **X**

D an atom of **Y** and an atom of **Z**

9 Which substance contains covalent bonds, but also conducts electricity?

A brass

B graphite

C iodine

D steel

10 One mole of each of the following compounds is burnt in excess oxygen.

Which compound will produce three moles of carbon dioxide and three moles of steam only?

A C_3H_8 **B** C_3H_7OH **C** $C_3H_7CO_2H$ **D** $CH_3CO_2CH_3$

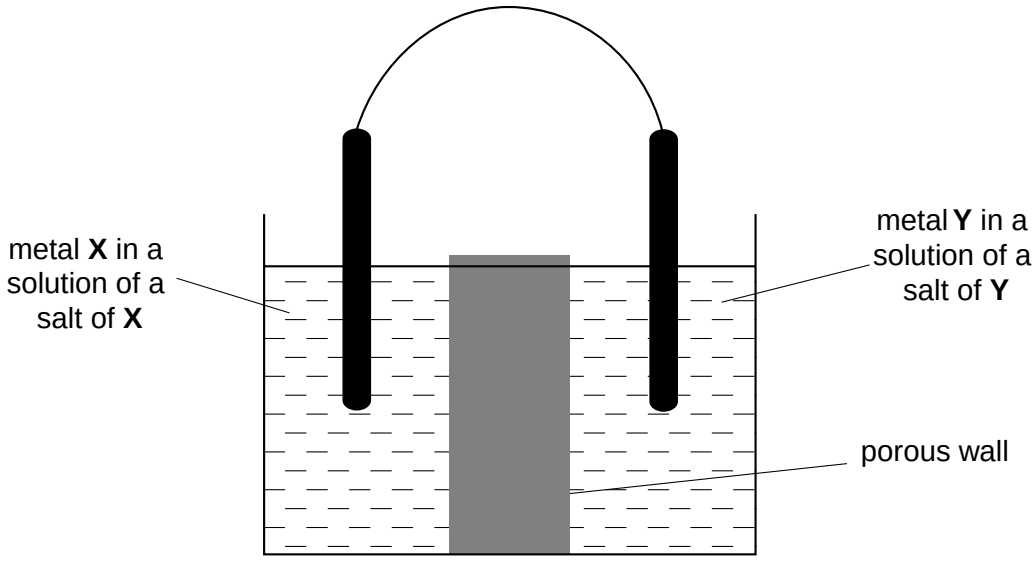
11 When zinc reacts with dilute sulphuric acid a gas is released.

What happens to the zinc and what is the gas released?

	the zinc is	the gas is
A	oxidised	hydrogen
B	oxidised	sulphur dioxide
C	reduced	hydrogen
D	reduced	sulphur dioxide

[Turn over

12 Which pair of metals **X** and **Y** will produce the highest voltage when used as electrodes in a simple cell?



	metal **X**	metal **Y**
A	copper	silver
B	magnesium	silver
C	magnesium	zinc
D	zinc	copper

13 Four electrolytes were electrolysed using carbon electrodes.

Which set of data is correct?

	electrolyte	product at	
		anode	cathode
A	$CuSO_4$ (aq)	oxygen	copper
B	$NaCl$ (aq)	chlorine	sodium
C	NaH (l)	sodium	hydrogen
D	$PbBr_2$ (l)	lead	bromine

14 Which pair of substances are isotopes?

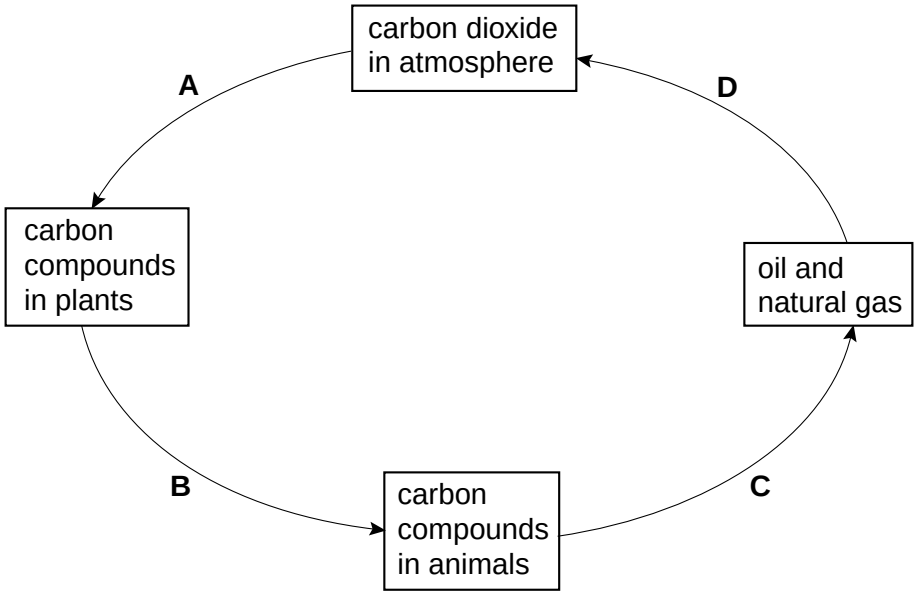
A $^{12}_{6}C$ and $^{14}_{6}C$

B carbon dioxide and carbon monoxide

C diamond and graphite

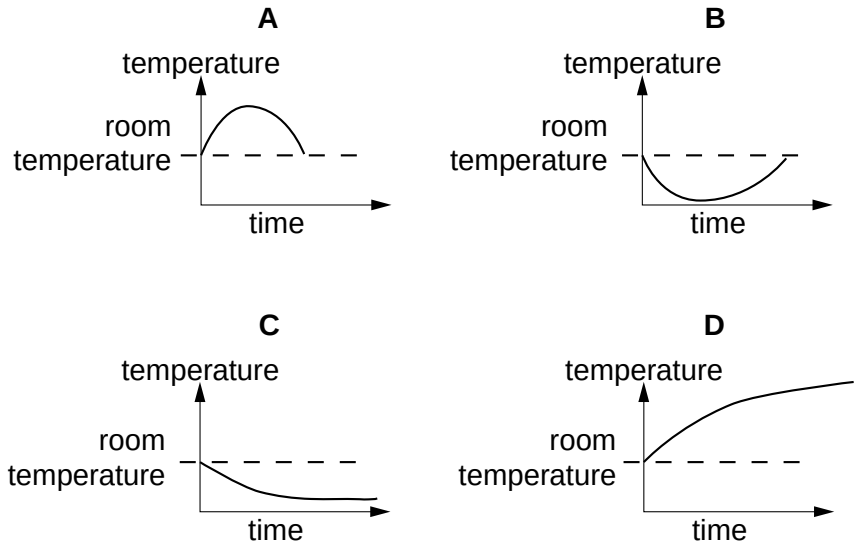
D C_2H_4 and C_3H_6

15 Which step in the diagram shows the process of photosynthesis?



16 Dissolving ammonium nitrate in water is endothermic.

Which graph shows how the temperature alters as the ammonium nitrate is added to water and then the solution is left to stand?



[Turn over

17 If a strip of magnesium is dropped into excess hydrochloric acid an exothermic reaction occurs.

The rate of this reaction increases during the first few seconds because

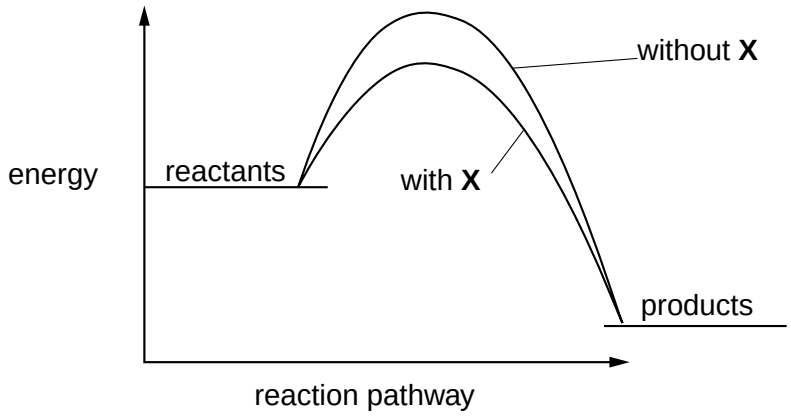
A the amount of magnesium is decreasing.

B the magnesium is acting as a catalyst.

C the solution is becoming hotter.

D the surface area of the magnesium is increasing.

18 The energy profile diagrams show how adding a substance **X** to a reaction mixture changes the reaction pathway.



Which change is likely to be observed when **X** is added to the reaction mixture?

A The reaction becomes less exothermic.

B The reaction becomes more exothermic.

C The speed of the reaction decreases.

D The speed of the reaction increases.

19 Which process does **not** involve either oxidation or reduction?

A formation of ammonium sulphate from ammonia and sulphuric acid

B formation of nitrogen monoxide from ammonia

C formation of sulphuric acid from sulphur

D formation of zinc from zinc blende (ZnS)

20 In separate experiments, an excess of aqueous sodium hydroxide or aqueous ammonia was gradually added to a solution **X**.

In both experiments, a precipitate was obtained which dissolved in an excess of the added reagent.

What could **X** contain?

A copper(II) nitrate

B iron(II) nitrate

C iron(III) nitrate

D zinc nitrate

21 An excess of dilute sulphuric acid reacts with both aqueous barium hydroxide and aqueous barium chloride. In what way are the two reactions the same?

A A gas is produced.

B An insoluble salt is produced.

C The final pH is 7.

D Water is produced.

22 Which property decides the order of the elements in the Periodic Table?

A the masses of their atoms

B the number of electrons in the outer shell

C the number of neutrons in the nucleus

D the number of protons in the nucleus

23 The proton number of indium, In, is 49.

What is the most likely formula for the oxide of indium?

A In_2O **B** In_2O_3 **C** InO **D** InO_2

24 Which element in the table is likely to be a transition metal?

	element	*melting point*	*colour of chloride*
A		high	blue
B		low	green
C		high	white
D		low	white

[Turn over

25 Which feature of a metal's structure is responsible for it conducting electricity?

A It contains positive ions.

B It has a "sea of electrons".

C Its ions are tightly packed together.

D Its positive ions attract electrons.

26 Aluminium is extracted from purified bauxite by electrolysis but iron is extracted from haematite by reduction with coke.

Why is iron not extracted by electrolysis?

A Haematite needs to be purified but bauxite does not.

B Iron is less reactive than aluminium.

C Reduction with coke is cheaper than electrolysis.

D Reduction with coke gives a purer product than electrolysis.

27 Old steel drums corrode quickly in a damp atmosphere but aluminium cans do not.

Which of the following correct statements explains this behaviour of aluminium?

A Aluminium has only one valency.

B Aluminium has a lower density than iron.

C Aluminium is above iron in the activity series.

D Aluminium is protected by its oxide layer.

28 Caesium is a metal that is more reactive than aluminium.

Which reaction would produce caesium?

A electrolysing aqueous caesium chloride

B electrolysing molten caesium chloride

C heating caesium carbonate

D heating caesium oxide with carbon

29 Which of the following gases **cannot** be removed from the exhaust gases of a petrol powered car by its catalytic converter?

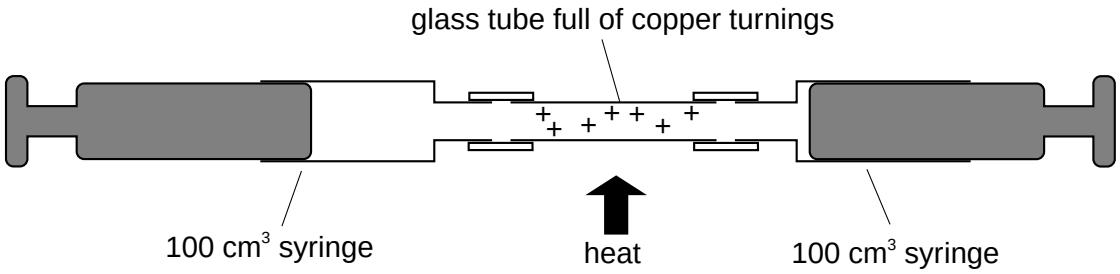
A carbon dioxide

B carbon monoxide

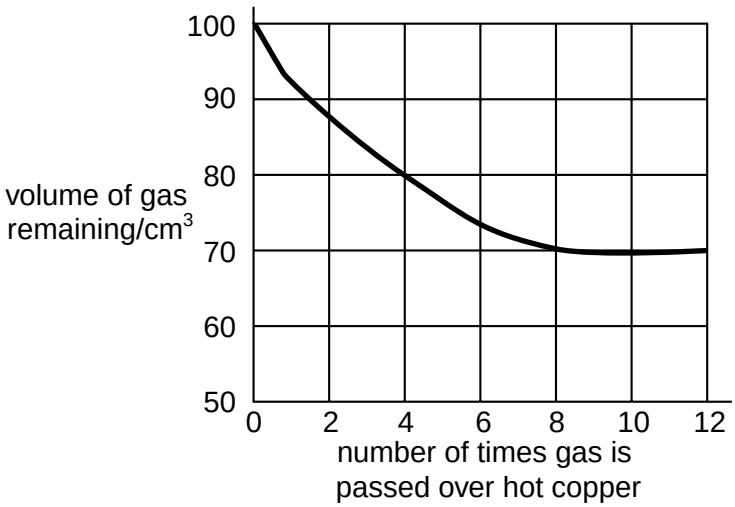
C hydrocarbons

D nitrogen dioxide

30 A 100 cm^3 sample of bottled gas used for diving was placed in a gas syringe in the apparatus shown.



The gas was passed backward and forward over heated copper turnings. The results obtained were used to plot the graph.



What is the percentage of oxygen in the bottled gas?

A 20% **B** 30% **C** 70% **D** 80%

31 In the Haber process, nitrogen and hydrogen react to form ammonia.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2\,NH_3(g) \quad \Delta H = -92\,kJ/mol$$

Which factor increases **both** the speed of reaction and the amount of ammonia produced?

A addition of a catalyst

B decreasing the temperature

C increasing the pressure

D increasing the temperature

[Turn over

32 Nitrates from fertilisers used on farmland can cause pollution.

Why do nitrates pollute rivers?

A Nitrates are salts.

B Nitrates are very soluble in water.

C Nitrates contain oxygen.

D Nitrate ions are negatively charged.

33 Which representation of dilute sulphuric acid is correct?

A $H_2(aq) + SO_4^{2-}(aq)$

B $2H^+(aq) + SO_4^{2-}(aq)$

C $2H^+(aq) + SO_4^-(aq)$

D $H_2SO_4(l)$

34 Which statement describes what happens when hydrogen and oxygen are used in a fuel cell?

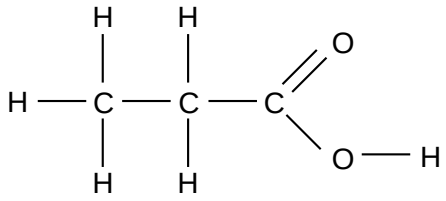
A Electricity is generated directly.

B Electricity is used to produce water.

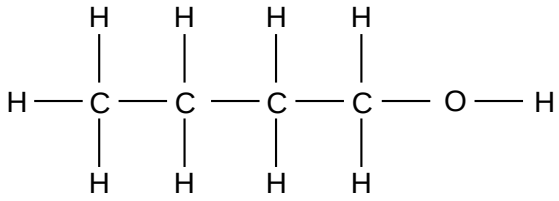
C Hydrogen is burned to form steam.

D Hydrogen reacts to form a hydrocarbon fuel.

35 The structures of an acid and an alcohol are shown.



acid



alcohol

Which pairing of names correctly identify the two compounds?

	acid	alcohol
A	ethanoic	butanol
B	ethanoic	propanol
C	propanoic	propanol
D	propanoic	butanol

36 Which physical property of the alkanes does **not** increase as relative molecular mass increases?

A boiling point

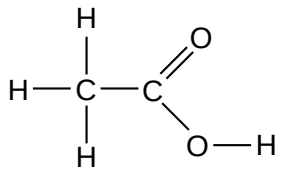
B flammability

C melting point

D viscosity

37 The structures of four organic compounds are shown.

1



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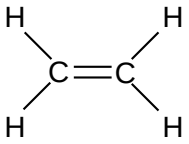

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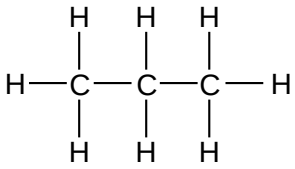

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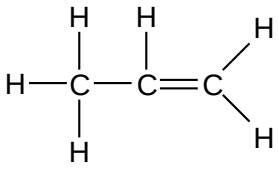
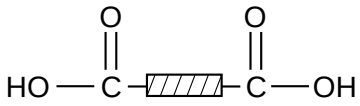


Which compounds decolourise bromine water?

A 1 and 2 **B** 1, 2 and 4 **C** 2 and 4 **D** 3 and 4

38 A polymer X was hydrolysed and the two products were



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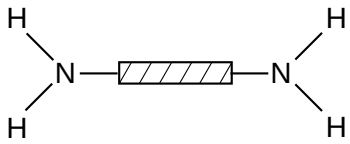


What can be deduced about X?

A It was a condensation polymer.

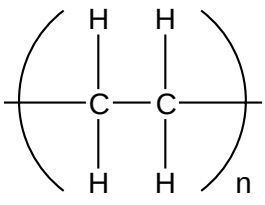
B It was starch.

C It was made by addition polymerisation.

D It was *Terylene*.

39 Which polymer has the empirical formula CH?

A



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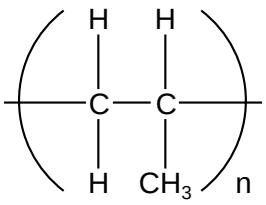

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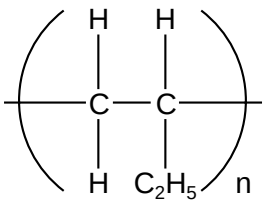

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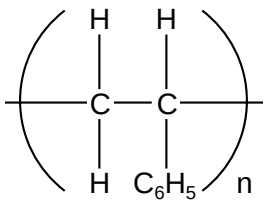

40 In the polymerisation of ethene to form poly(ethene), there is no change in

A boiling point.

B density.

C mass.

D molecular formula.

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).