



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CHEMISTRY**

**0620/11**

Paper 1 Multiple Choice

**October/November 2013**

**45 Minutes**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

\* 6 0 4 7 6 7 6 0 4 9 \*

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.  
**DO NOT WRITE IN ANY BARCODES.**

There are **forty** questions on 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.

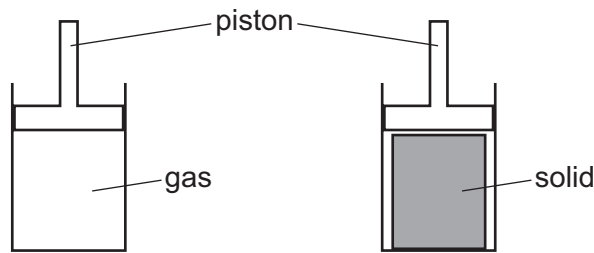
**Read the instructions on the Answer Sheet very carefully.**

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 20.  
Electronic calculators may be used.

This document consists of **18** printed pages and **2** blank pages.



- 1 An attempt was made to compress a gas and a solid using the apparatus shown.



Which substance would be compressed and what is the reason for this?

	substance	reason
<b>A</b>	gas	the gas particles are close together
<b>B</b>	gas	the gas particles are far apart
<b>C</b>	solid	the solid particles are close together
<b>D</b>	solid	the solid particles are far apart

- 2 A student measures the rate of two reactions.

In one reaction, there is a change in mass of the reactants during the reaction.

In the second reaction, there is a change in temperature during the reaction.

Which piece of apparatus would be essential in **both** experiments?

- A** balance
- B** clock
- C** pipette
- D** thermometer

- 3 Diagram 1 shows the paper chromatogram of substance X.

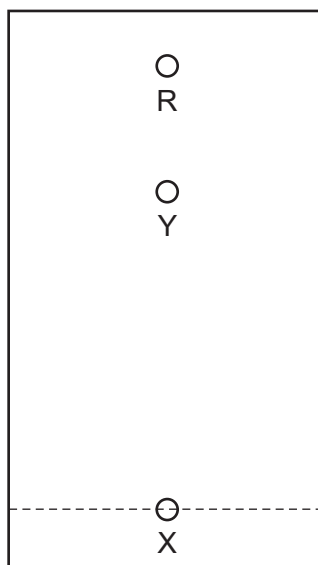


diagram 1

Diagram 2 shows the cooling curve for substance Y.

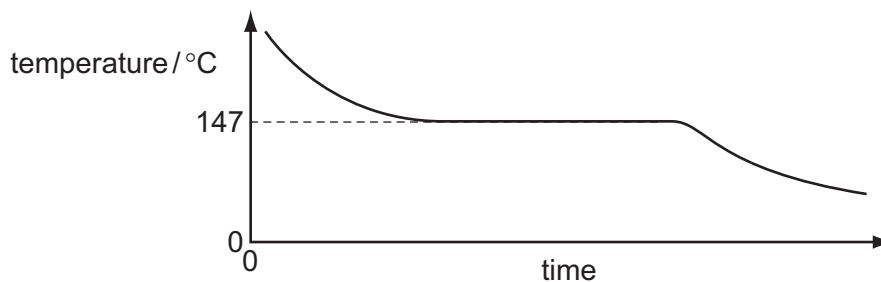


diagram 2

Which statement about X and Y is correct?

- A** X is a mixture and Y is a pure substance.
- B** X is a pure substance and Y is a mixture.
- C** X and Y are mixtures.
- D** X and Y are pure substances.

4 Element X has 7 protons.

Element Y has 8 more protons than X.

Which statement about element Y is correct?

- A Y has more electron shells than X.
- B Y has more electrons in its outer shell than X.
- C Y is in a different group of the Periodic Table from X.
- D Y is in the same period of the Periodic Table as X

5 Which statements about a sodium atom,  ${}_{11}^{23}\text{Na}$ , are correct?

- 1 The number of protons and neutrons is the same.
- 2 The number of protons and electrons is the same.
- 3 The number of outer electrons is one.

- A 1, 2 and 3    B 1 and 2 only    C 1 and 3 only    D 2 and 3 only

6 Rubidium is in Group I of the Periodic Table and bromine is in Group VII.

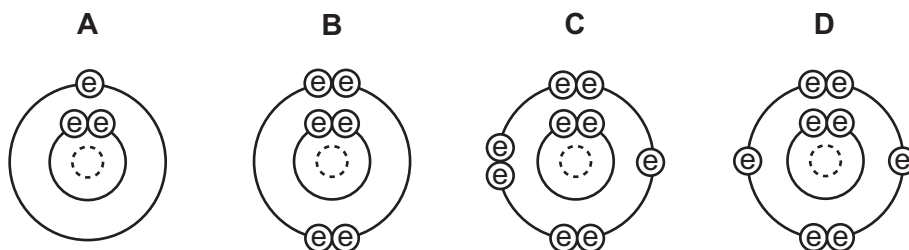
Rubidium reacts with bromine to form an ionic compound.

Which row shows the electron change taking place for rubidium and the correct formula of the rubidium ion?

	electron change	formula of ion formed
A	electron gained	$\text{Rb}^+$
B	electron gained	$\text{Rb}^-$
C	electron lost	$\text{Rb}^+$
D	electron lost	$\text{Rb}^-$

7 The diagrams show the electron arrangements in the atoms of four elements.

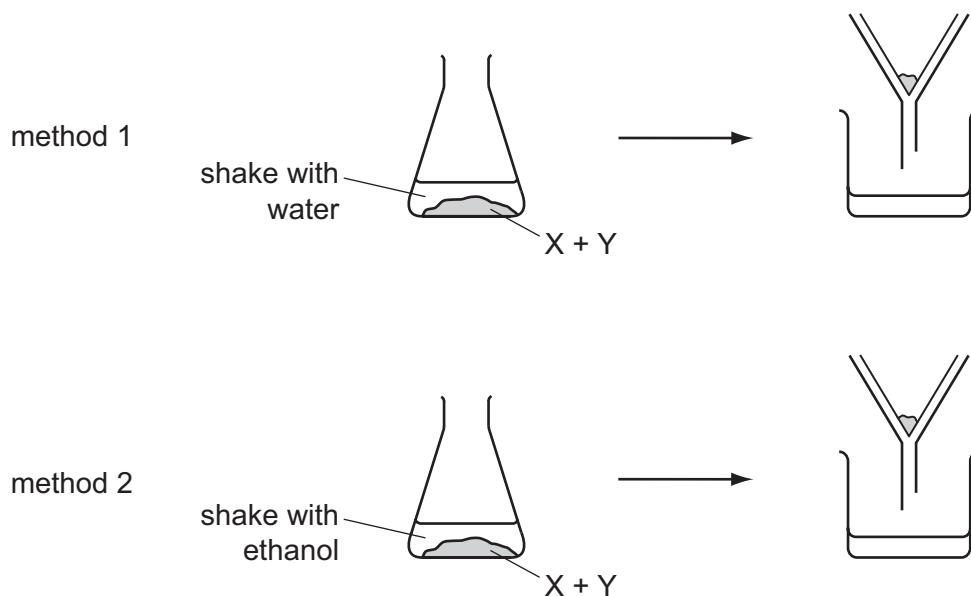
Which element does **not** form a covalent bond?



key  
 ⊖ electron  
 ○ nucleus

- 8 A solid mixture contains an ionic salt, X, and a covalent organic compound, Y.

Two students suggest methods of separating the mixture as shown.



Which methods of separation are likely to work?

	1	2
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 9 The formulae of compounds W, X and Y are shown.



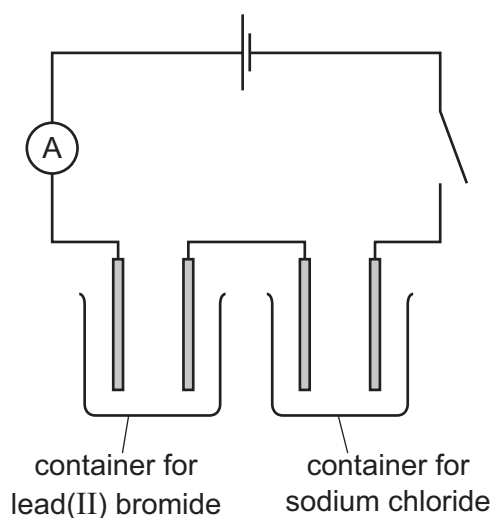
Which statement is correct?

- A** W contains twice as many hydrogen atoms as oxygen atoms.
- B** X contains the most oxygen atoms.
- C** Y contains the most hydrogen atoms.
- D** Y contains the same number of hydrogen and oxygen atoms.

10 Which relative molecular mass,  $M_r$ , is **not** correct for the molecule given?

	molecule	$M_r$
<b>A</b>	ammonia, $\text{NH}_3$	17
<b>B</b>	carbon dioxide, $\text{CO}_2$	44
<b>C</b>	methane, $\text{CH}_4$	16
<b>D</b>	oxygen, $\text{O}_2$	16

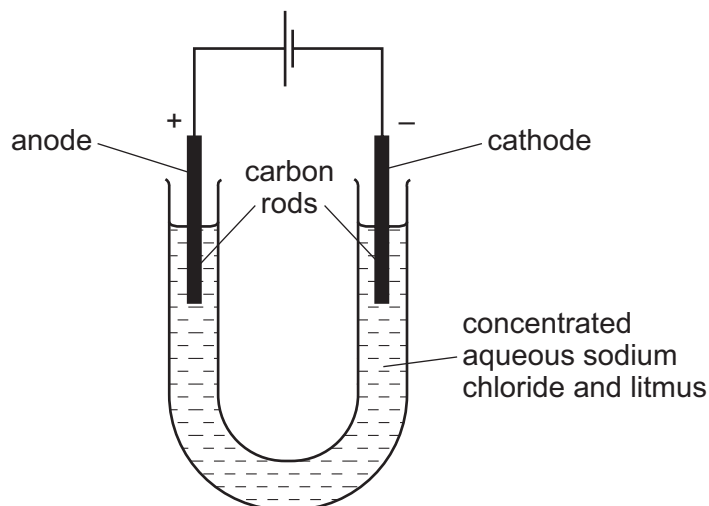
11 The diagram shows the circuit for electrolysis of lead(II) bromide and sodium chloride to liberate the metal.



In what form are these salts electrolysed for liberating the metal?

	lead(II) bromide	sodium chloride
<b>A</b>	concentrated solution	concentrated solution
<b>B</b>	concentrated solution	molten
<b>C</b>	molten	concentrated solution
<b>D</b>	molten	molten

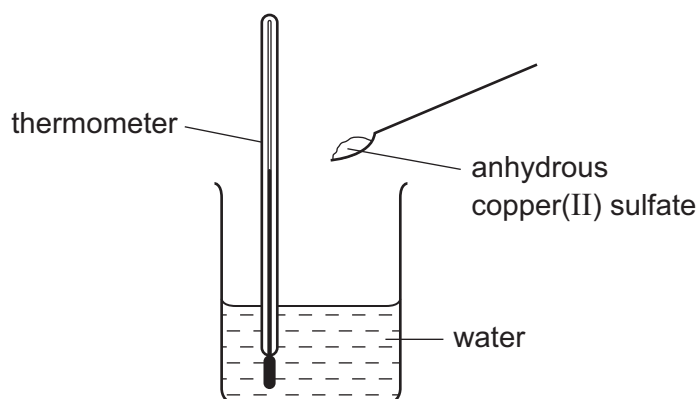
- 12 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is the colour of the litmus at each electrode after five minutes?

	colour at anode	colour at cathode
<b>A</b>	blue	red
<b>B</b>	red	blue
<b>C</b>	red	colourless
<b>D</b>	colourless	blue

- 13 When anhydrous copper(II) sulfate is added to water a solution is formed and heat is given out.



Which row correctly shows the temperature change and the type of reaction taking place?

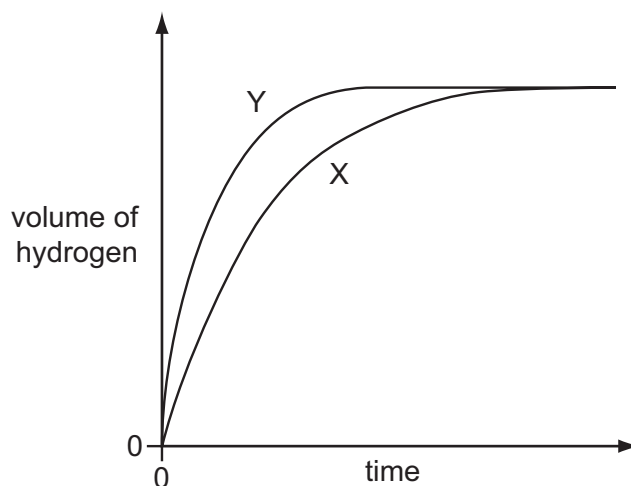
	temperature change	type of reaction
<b>A</b>	decreases	endothermic
<b>B</b>	decreases	exothermic
<b>C</b>	increases	endothermic
<b>D</b>	increases	exothermic

14 Which fuel does **not** produce carbon dioxide when it burns?

- A coal
- B hydrogen
- C methane
- D petrol

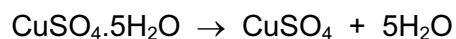
15 A student investigates the rate of reaction between zinc and an excess of sulfuric acid.

The graph shows the results of two experiments, X and Y.



Which change explains the difference between X and Y?

- A A catalyst is added in Y.
  - B A lower temperature is used in Y.
  - C Larger pieces of zinc are used in Y.
  - D Less concentrated acid is used in Y.
- 16 Anhydrous copper(II) sulfate can be made by heating hydrated copper(II) sulfate.

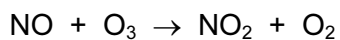
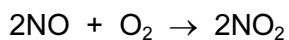
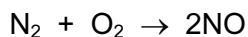


What can be added to anhydrous copper(II) sulfate to turn it into hydrated copper(II) sulfate?

- A concentrated sulfuric acid
- B sodium hydroxide powder
- C sulfur dioxide
- D water



17 The reactions shown may occur in the air during a thunder storm.



Which row shows what happens to the reactant molecules in each of these reactions?

	$\text{N}_2$	NO	$\text{O}_3$
<b>A</b>	oxidised	oxidised	oxidised
<b>B</b>	oxidised	oxidised	reduced
<b>C</b>	reduced	reduced	oxidised
<b>D</b>	reduced	reduced	reduced

18 Which are properties of an acid?

1 reacts with ammonium sulfate to form ammonia

2 turns red litmus blue

	1	2
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

19 Which of the following are properties of the oxides of non-metals?

	property 1	property 2
<b>A</b>	acidic	covalent
<b>B</b>	acidic	ionic
<b>C</b>	basic	covalent
<b>D</b>	basic	ionic

20 Compound X is tested and the results are shown in the table.

test	result
aqueous sodium hydroxide is added, then heated gently	gas given off which turns damp red litmus paper blue
dilute hydrochloric acid is added	effervescence, gas given off which turns limewater milky

Which ions are present in compound X?

- A ammonium ions and carbonate ions
  - B ammonium ions and chloride ions
  - C calcium ions and carbonate ions
  - D calcium ions and chloride ions
- 21 Calcium, on the left of Period 4 of the Periodic Table, is more metallic than bromine on the right of this period.

Why is this?

Calcium has

- A fewer electrons.
  - B fewer protons.
  - C fewer full shells of electrons.
  - D fewer outer shell electrons.
- 22 The diagrams show the labels of four bottles.

Which label is **not** correct?

A	B	C	D
Bromine Br <sub>2</sub>	Iodine I <sub>2</sub>	Potassium K	Sodium Na
Harmful liquid. Do not spill.	Danger Avoid breathing vapour from the solid.	Danger Store under water.	Danger Store under oil.



26 M is a shiny silver metal. It has a melting point of 1455 °C. Many of its compounds are

What is metal M?

- A aluminium
- B copper
- C mercury
- D nickel

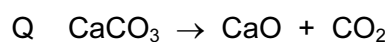
27 Reactions of three metals and their oxides are listed in the table.

metal	reacts with cold water	metal oxide reacts with carbon
W	no	no
X	no	yes
Y	yes	no

What is the order of reactivity of the metals?

	least reactive	→	most reactive
A	W	X	Y
B	X	W	Y
C	X	Y	W
D	Y	W	X

28 Equations P and Q represent two reactions which occur inside a blast furnace.



Which type of reactions are P and Q?

	P	Q
A	redox	redox
B	redox	thermal decomposition
C	thermal decomposition	redox
D	thermal decomposition	thermal decomposition

29 Which row describes the uses of mild steel and stainless steel?

	mild steel	stainless steel
<b>A</b>	car bodies, cutlery	chemical plant, machinery
<b>B</b>	car bodies, machinery	chemical plant, cutlery
<b>C</b>	chemical plant, cutlery	car bodies, machinery
<b>D</b>	chemical plant, machinery	car bodies, cutlery

30 In which process is carbon dioxide **not** formed?

- A** burning of natural gas
- B** fermentation
- C** heating lime
- D** respiration

31 Farmers add calcium oxide (lime) and ammonium salts to their fields.

The compounds are not added at the same time because they react with each other.

Which gas is produced in this reaction?

- A** ammonia
- B** carbon dioxide
- C** hydrogen
- D** nitrogen

32 The diagrams show four uses of iron.

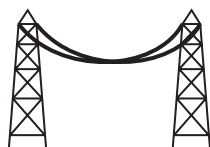
In which of these uses is the iron most likely to rust?

**A**



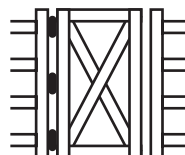
iron bucket  
electroplated  
with zinc

**B**



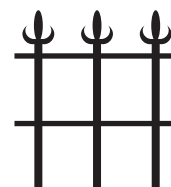
iron cored  
aluminium  
electricity cables

**C**



iron hinges  
on a gate

**D**



painted  
iron fence

33 Which air pollutant is **not** made when coal burns in a power station?

- A carbon monoxide
- B lead compounds
- C nitrogen oxides
- D sulfur dioxide

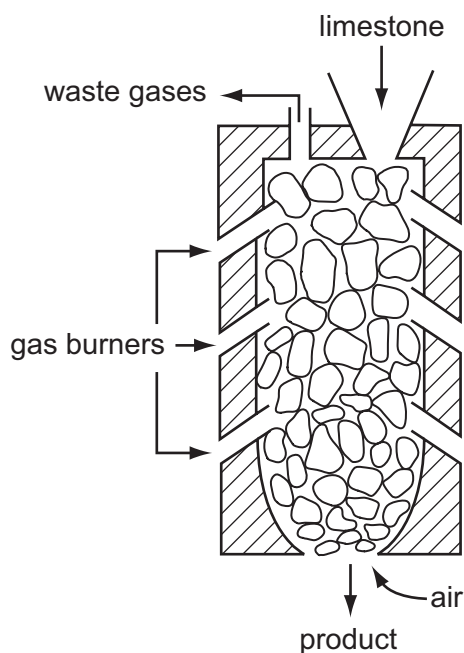
34 In many countries river water is used for the washing of clothes.

The same water is not considered to be safe for drinking.

Why is it **not** safe for drinking?

- A because river water contains dissolved salts
- B because river water may contain harmful bacteria
- C because river water may contain small particles of sand
- D because river water may contain soap from washing clothes

35 The diagram shows a kiln used to heat limestone.



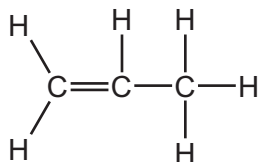
What is the product and what waste gas is formed?

	product	waste gas
<b>A</b>	lime, CaO	carbon monoxide
<b>B</b>	lime, CaO	carbon dioxide
<b>C</b>	slaked lime, Ca(OH) <sub>2</sub>	carbon monoxide
<b>D</b>	slaked lime, Ca(OH) <sub>2</sub>	carbon dioxide

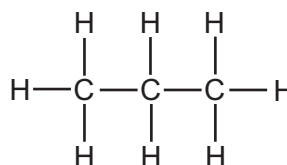
36 Three types of organic compound are alkanes, alkenes and alcohols.

Which structure does **not** belong to any of these three types of compound?

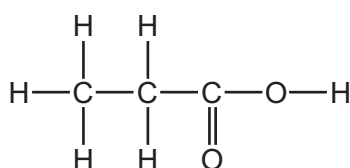
A



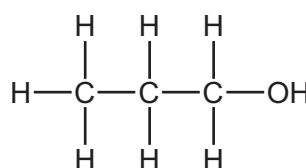
B



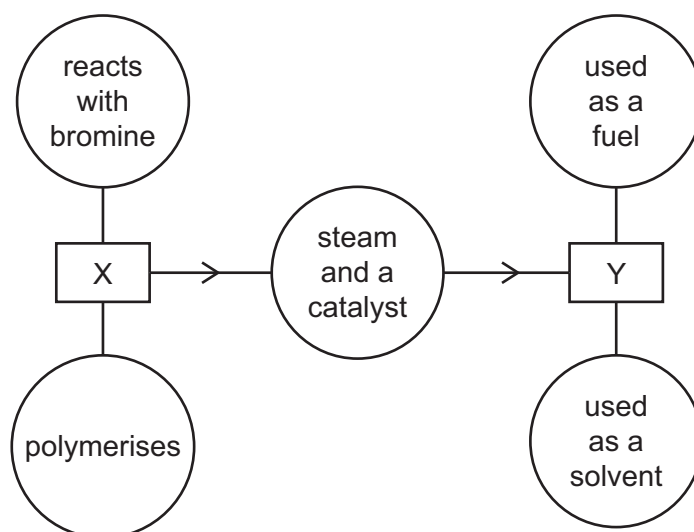
C



D



37 The diagram shows some properties of two organic compounds X and Y.



What are X and Y?

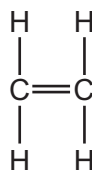
	X	Y
<b>A</b>	ethane	ethanoic acid
<b>B</b>	ethane	ethanol
<b>C</b>	ethene	ethanoic acid
<b>D</b>	ethene	ethanol

38 Petroleum is a mixture of hydrocarbons which can be separated into fractions using distillation.

Which fraction is used as fuel in jet engines?

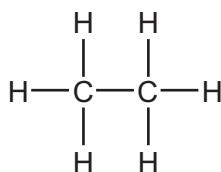
- A bitumen
- B gasoline
- C kerosene
- D naphtha

39 The diagram represents ethene.

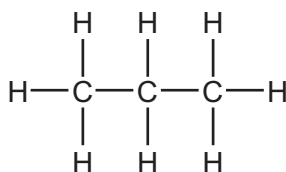


Which compound has chemical properties similar to those of ethene?

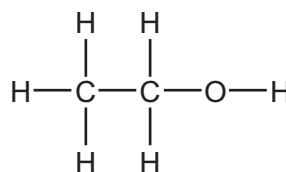
**A**



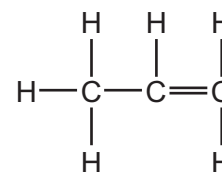
**B**



**C**

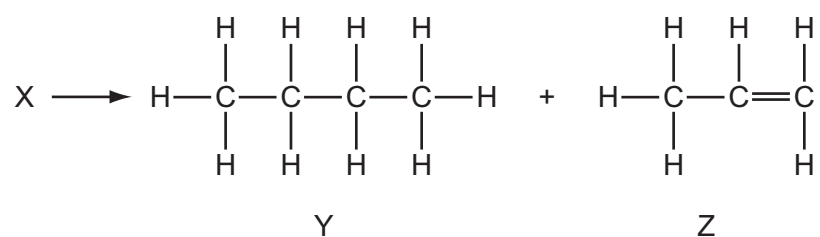


**D**





- 40 A chemist carried out a cracking reaction on a hydrocarbon, X, and obtained two products, Y and Z.



The chemist then wrote the following statements in his notebook.

- 1 A molecule of X has 7 carbon atoms.
- 2 Y is unsaturated.
- 3 Z will decolourise bromine water.

Which statements are correct?

- A** 3 only      **B** 1 and 2      **C** 1 and 3      **D** 1, 2 and 3





**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																							
		I	II	III	IV	V	VI	VII	0																
		1 <b>H</b> Hydrogen 1																							
7	9	<b>Li</b> Lithium 3	<b>Be</b> Beryllium 4																						
23	24	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12																						
39	40	<b>K</b> Potassium 19	<b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36						
85	88	<b>Rb</b> Rubidium 37	<b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	101 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	115 <b>Sn</b> Tin 50	119 <b>Sb</b> Antimony 51	122 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54							
133	137	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86							
87	226	<b>Fr</b> Francium 87	<b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																					
		*58-71 Lanthanoid series										†90-103 Actinoid series													
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;"><b>X</b></td> </tr> <tr> <td style="padding: 2px;">b</td> <td style="padding: 2px;"></td> </tr> </table>										a	<b>X</b>	b		a = relative atomic mass X = atomic symbol b = proton (atomic) number									
a	<b>X</b>																								
b																									
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	146 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	103 <b>Lr</b> Lawrencium 103										

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

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