UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/01**

Paper 1 Multiple Choice

May/June 2006

45 minutes

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

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.

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.
You may use a calculator.

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

1 At room temperature, in which substance are the particles furthest apart?

A H_2 **B** H_2O **C** Mg **D** MgO

2 Which method can be used to obtain crystals from aqueous copper(II) sulphate?

A chromatography

B electrolysis

C evaporation

D neutralisation

3 Five elements have proton numbers 10, 12, 14, 16 and 18.

What are the proton numbers of the three elements that form oxides?

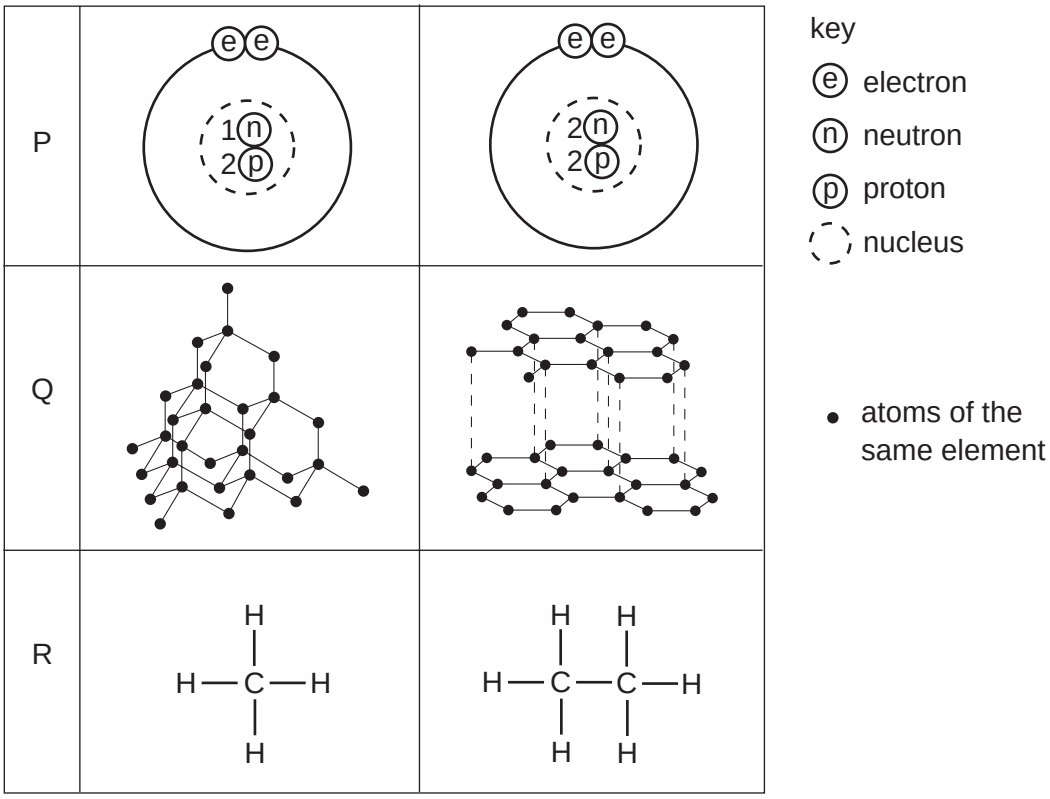
A 10, 12 and 14

B 10, 14 and 18

C 12, 14 and 16

D 14, 16 and 18

4 The rows P, Q and R in the table show three pairs of structures.



Which pair or pairs are isotopes?

A P only **B** P and Q only **C** Q only **D** Q and R only

5 Which numbers are added to give the nucleon number of an ion?

A number of electrons + number of neutrons

B number of electrons + number of protons

C number of electrons + number of protons + number of neutrons

D number of protons + number of neutrons

6 In the molecules CH_4, HCl and H_2O, which atoms use **all** of their outer shell electrons in bonding?

A C and Cl

B C and H

C Cl and H

D H and O

7 Which change to an atom occurs when it forms a positive ion?

A It gains an electron.

B It gains a proton.

C It loses an electron.

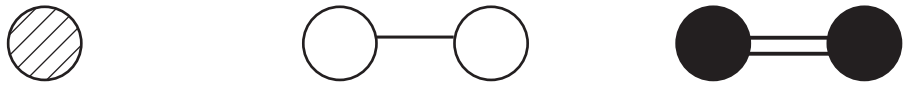
D It loses a proton.

8 For which compound is the formula correct?

	compound	formula
A	ammonia	NH_4
B	carbon dioxide	CO
C	potassium oxide	P_2O
D	zinc chloride	$ZnCl_2$

[Turn over

9 The diagrams show the molecules of three elements.



1 2 3

Which of these elements are present in water?

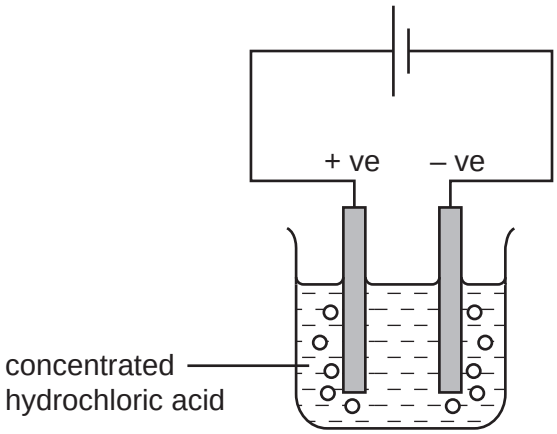
A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

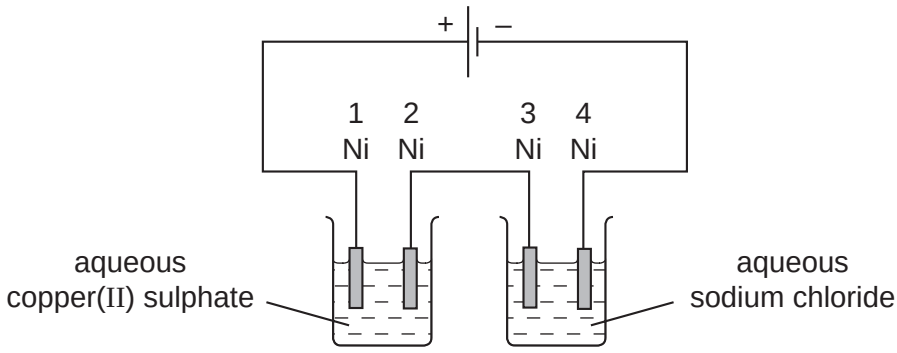
10 The diagram shows that two gases are formed when concentrated hydrochloric acid is electrolysed between inert electrodes.



Which line correctly describes the colours of the gases at the electrodes?

	anode (+ve)	cathode (–ve)
A	colourless	colourless
B	colourless	yellow-green
C	yellow-green	colourless
D	yellow-green	yellow-green

11 The diagram shows an electrolysis experiment to electroplate nickel with a different metal.



Which nickel electrodes are plated with a metal?

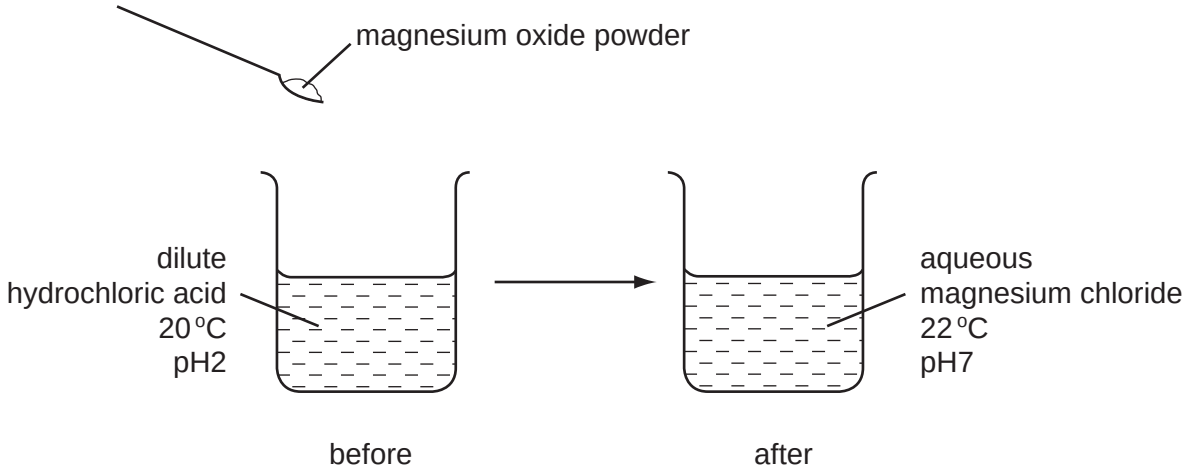
A 1 only

B 1 and 3 only

C 2 only

D 2 and 4 only

12 The diagram shows an experiment in which magnesium oxide powder is added to dilute hydrochloric acid.



Which terms describe the experiment?

	exothermic	neutralisation
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

13 Coal, methane and hydrogen are burned as fuels.

Which descriptions of this process are correct?

	what happens to the fuel	type of reaction
A	oxidised	endothermic
B	oxidised	exothermic
C	reduced	endothermic
D	reduced	exothermic

14 Two reactions involving water are shown.

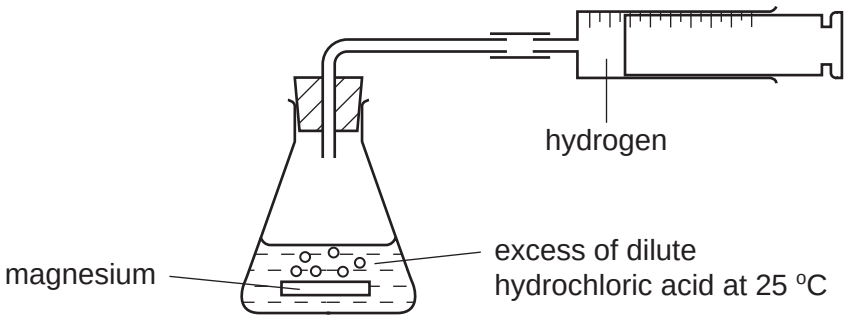
X $FeSO_4$ + water $\rightarrow$ hydrated iron(II) sulphate

Y Fe + O_2 + water $\rightarrow$ rust

Which of these reactions are reversible by heating?

	X	**Y**
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

15 The diagram shows a speed of reaction experiment.

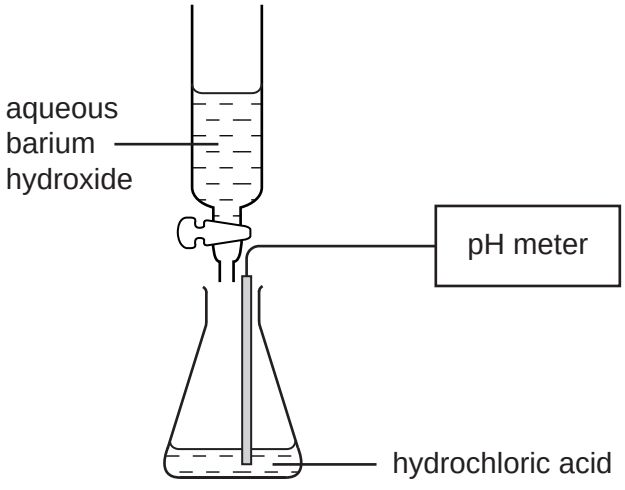


Increasing the concentration of the acid and increasing the temperature both affect the speed of reaction.

Which line of the table is correct?

	increase concentration of acid	increase temperature
A	decrease speed of reaction	decrease speed of reaction
B	decrease speed of reaction	increase speed of reaction
C	increase speed of reaction	decrease speed of reaction
D	increase speed of reaction	increase speed of reaction

16 Barium hydroxide is an alkali. It reacts with hydrochloric acid.



What happens to the pH of a solution of hydrochloric acid as an excess of aqueous barium hydroxide is added?

A The pH decreases from 14 but becomes constant at 7.

B The pH decreases from 14 to about 1.

C The pH increases from 1 but becomes constant at 7.

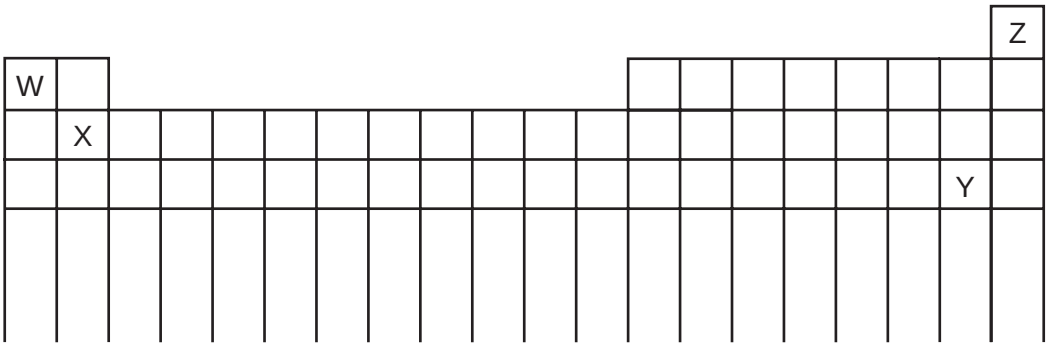
D The pH increases from 1 to about 14.

17 Element X is at the left-hand side of the Periodic Table.

Which line in the table shows the correct type and property of the oxide of X?

	type of oxide	property of oxide
A	metallic	acidic
B	metallic	basic
C	non-metallic	acidic
D	non-metallic	basic

18 The diagram shows the positions of some elements in the Periodic Table.



Which elements form ionic bonds with oxygen?

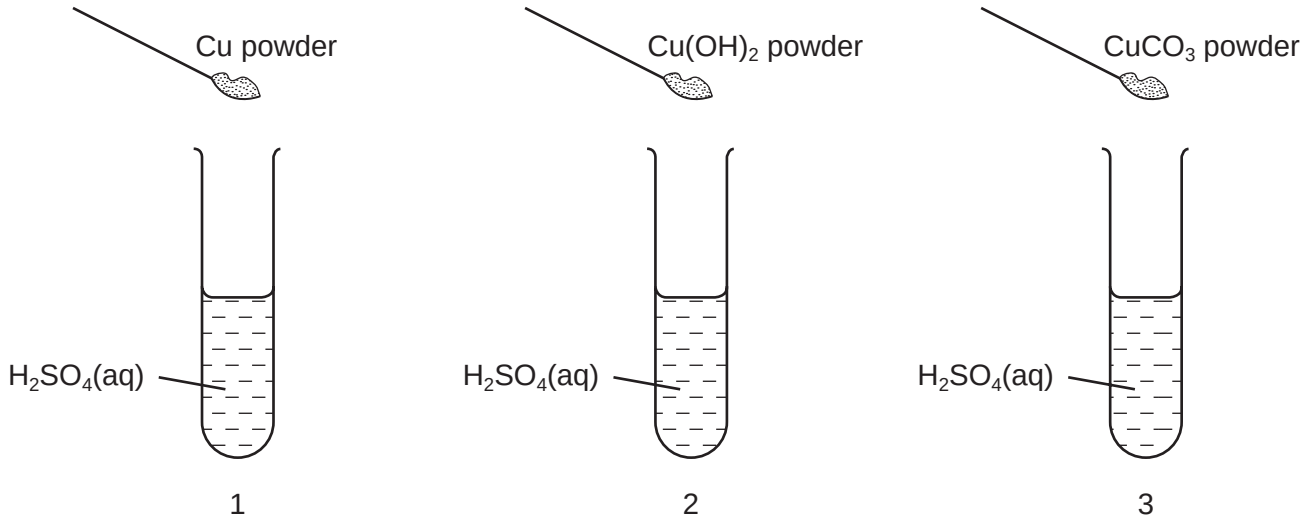
A W only

B W and X only

C Y only

D Y and Z only

19 The diagrams show three experiments using dilute sulphuric acid. Three different powders are added to the acid.



The mixtures are stirred.

Which test-tubes then contain Cu^{2+}(aq) ions?

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

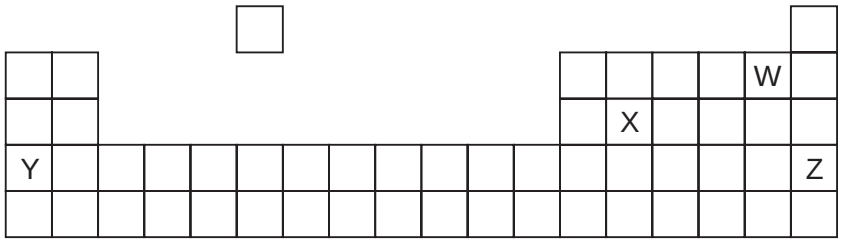
20 The equation shows the reaction between a halogen and aqueous bromide ions.

$$X_2 + 2Br^-(aq) \rightarrow 2X^-(aq) + Br_2$$
$$\text{…1…} \quad \text{…2…} \quad \text{…3…}$$

Which words should be written in gaps 1, 2 and 3?

	1	2	3
A	chlorine	brown	colourless
B	chlorine	colourless	brown
C	iodine	brown	colourless
D	iodine	colourless	brown

21 The diagram shows an outline of part of the Periodic Table.



Which two elements could form a covalent compound?

A W and X **B** W and Y **C** X and Y **D** X and Z

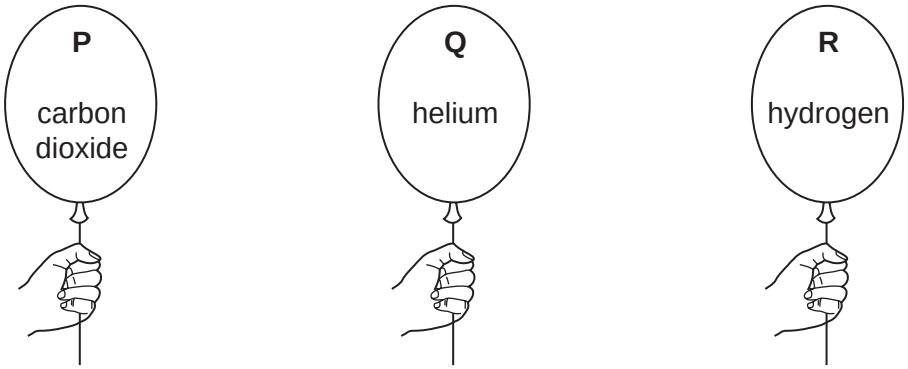
22 A student is asked to complete two sentences.

Metallic and non-metallic elements are classified in the ……1……. This can be used to ……2…… the properties of elements.

Which words correctly complete the gaps?

	gap 1	gap 2
A	Periodic Table	measure
B	Periodic Table	predict
C	reactivity series	measure
D	reactivity series	predict

23 The diagram shows three balloons held by children.



Which of the balloons float up into the air when the children let go?

A **P** only

B **P** and **R** only

C **Q** only

D **Q** and **R** only

24 Three mixtures are made.

1 $C + Fe_2O_3$

2 $Cu + Fe_2O_3$

3 $Mg + Fe_2O_3$

The mixtures are heated strongly.

Which of the elements C, Cu and Mg are reactive enough to reduce the iron oxide to iron?

A C and Cu only

B C and Mg only

C Cu and Mg only

D C, Cu and Mg

25 Which property do **all** metals have?

A Their densities are low.

B Their melting points are high.

C They act as catalysts.

D They conduct electricity.

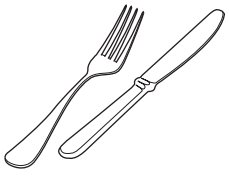
26 Copper, iron and zinc are all used to make things.

Which of these three metals are also used in the form of alloys?

	copper	iron	zinc
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✓

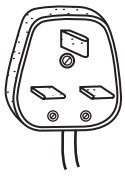
27 Which diagram shows a common use of stainless steel?

A

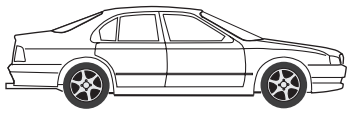


B

C

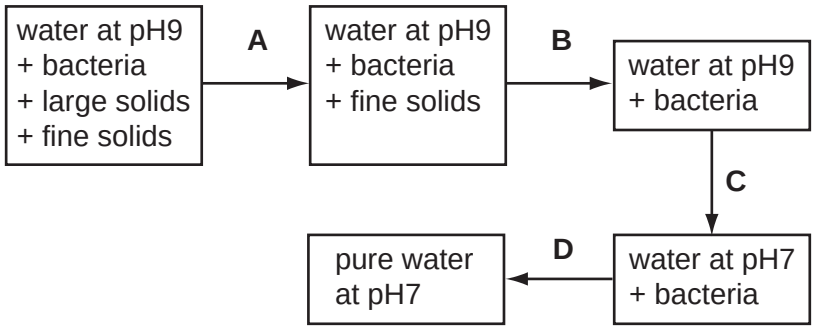


D



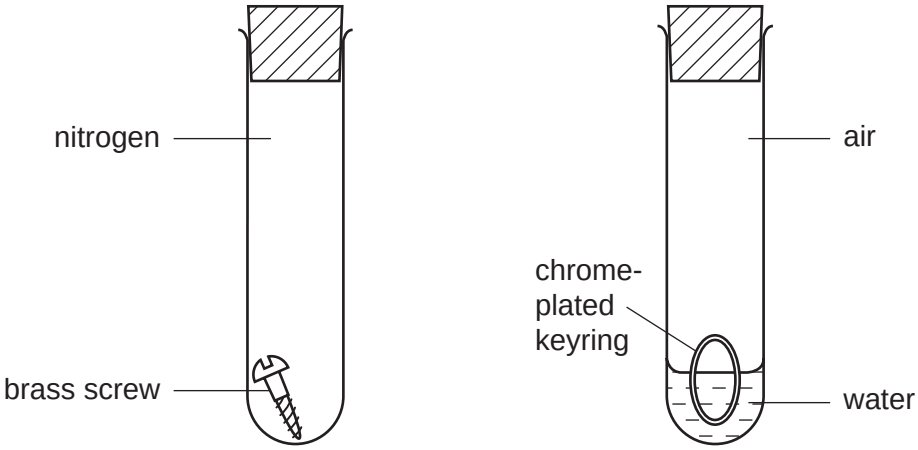
28 The diagram shows stages in the purification of water.

Which stage uses chlorine?



29 In experiments on rusting, some students are each given two metal objects to study.

One student set up his apparatus as shown.



Which objects rusted?

	brass screw	chrome-plated keyring
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

30 Which substance is **not** a pollutant of clean air?

A argon

B carbon monoxide

C nitrogen dioxide

D sulphur dioxide

31 Which metallic element is needed in a complete fertiliser?

A calcium

B magnesium

C potassium

D sodium

32 A newspaper article claims that carbon dioxide is formed as follows.

1 during respiration

2 when calcium carbonate reacts with hydrochloric acid

3 when methane burns in air

Which statements are correct?

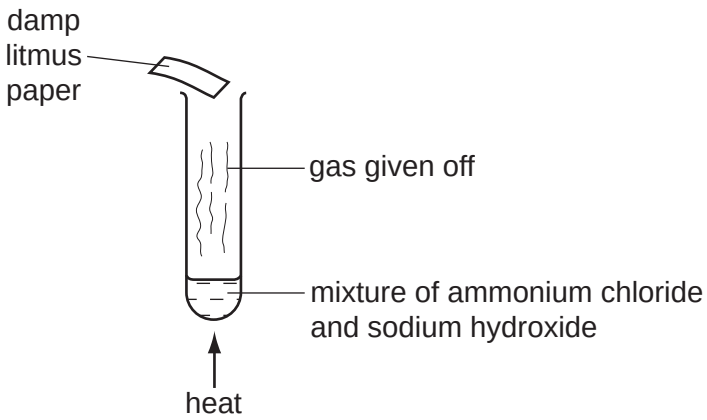
A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

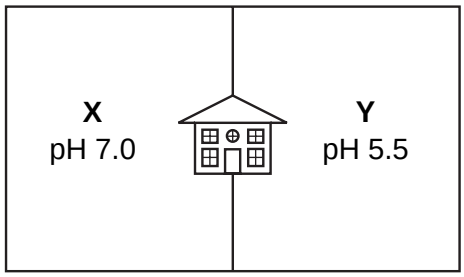
33 The diagram shows an experiment.



What is the name of the gas and the final colour of the litmus paper?

	gas	colour
A	ammonia	blue
B	ammonia	red
C	chlorine	white
D	chlorine	red

34 The diagram shows the pH values of the soil in **X** and **Y**, two parts of the garden of a house.

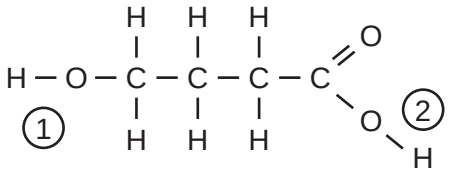


The house owner wishes to use lime to neutralise the soil in one part of the garden.

To which part should the lime be added, and why?

	part of garden	because lime is
A	**X**	acidic
B	**X**	basic
C	**Y**	acidic
D	**Y**	basic

35 In the molecule shown, the two –OH groups are numbered.



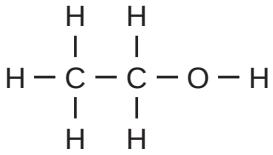
Which of these –OH groups react with aqueous sodium hydroxide?

	①	②
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

36 When a suitable catalyst is used, ethene reacts with steam.

What is the structure of the compound formed?

A



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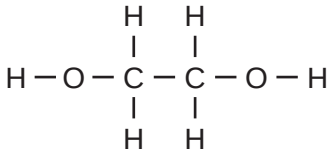
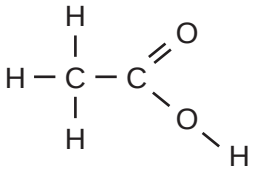
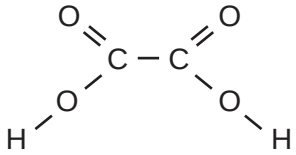


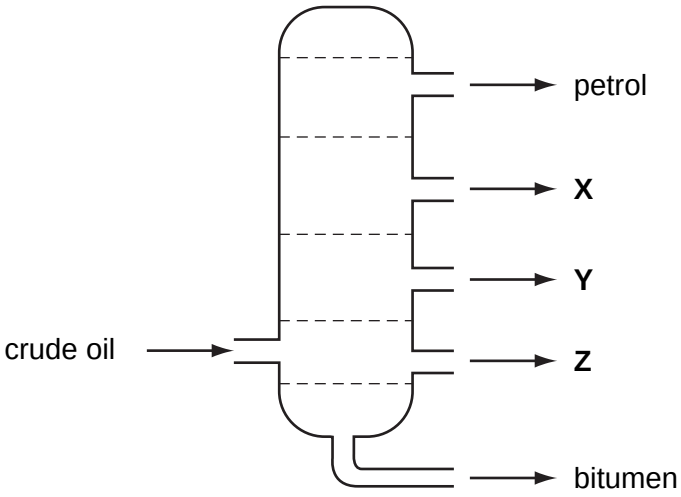
C



D



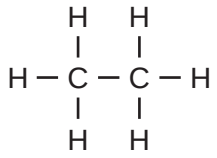
37 The diagram shows the separation of crude oil into fractions.



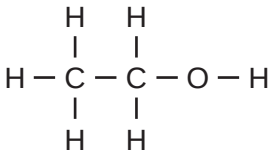
What could **X**, **Y** and **Z** represent?

	X	Y	Z
A	diesel	lubricating oil	paraffin
B	lubricating oil	diesel	paraffin
C	lubricating oil	paraffin	diesel
D	paraffin	diesel	lubricating oil

38 Which of the compounds shown are used as fuels?



1



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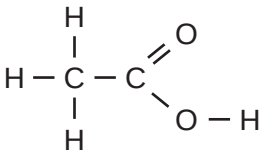
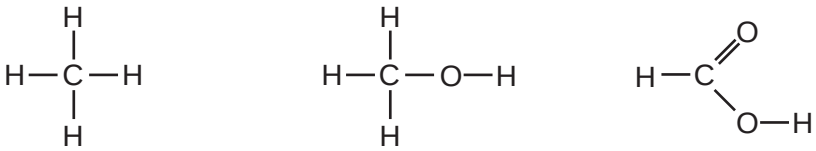


3

	1	2	3
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

39 Which set of diagrams shows three substances that are all in the same homologous series?

A



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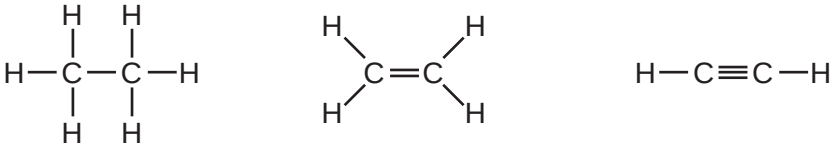

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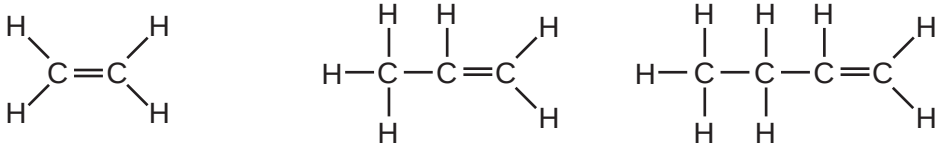

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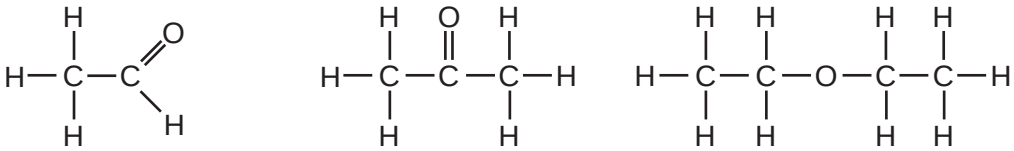
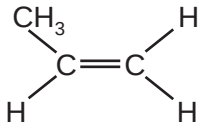
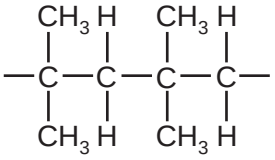


40 The diagram shows the structure of a small molecule.

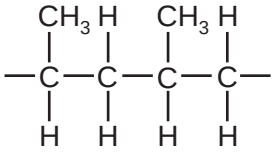


Which chain-like molecule is formed when these small molecules link together?

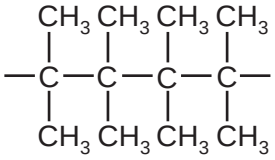
A



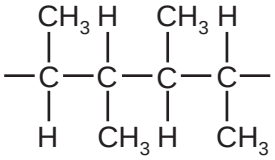
B



C



D



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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II									III	IV	V	VI	VII	0
															4 **He** Helium 2
					1 **H** Hydrogen 1										
										11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
										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
7 **Li** Lithium 3	9 **Be** Beryllium 4									70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
23 **Na** Sodium 11	24 **Mg** Magnesium 12									115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
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	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	209 **Po** Polonium 84	210 **At** Astatine 85	222 **Rn** Radon 86
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	201 **Hg** Mercury 80	197 **Au** Gold 79	195 **Pt** Platinum 78	192 **Ir** Iridium 77	190 **Os** Osmium 76	186 **Re** Rhenium 75
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	209 **Po** Polonium 84	210 **At** Astatine 85	222 **Rn** Radon 86
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	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

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