CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/01**

Paper 1 Multiple Choice

May/June 2003

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.

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

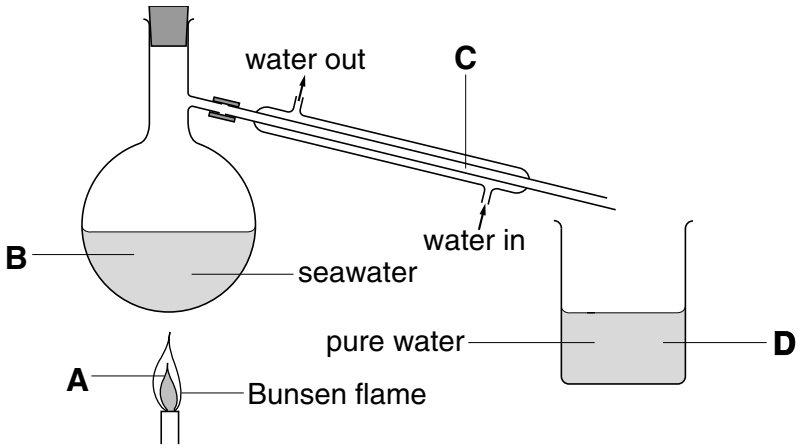
BR (PW) S41678/1

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 The diagram shows how to obtain pure water from seawater.

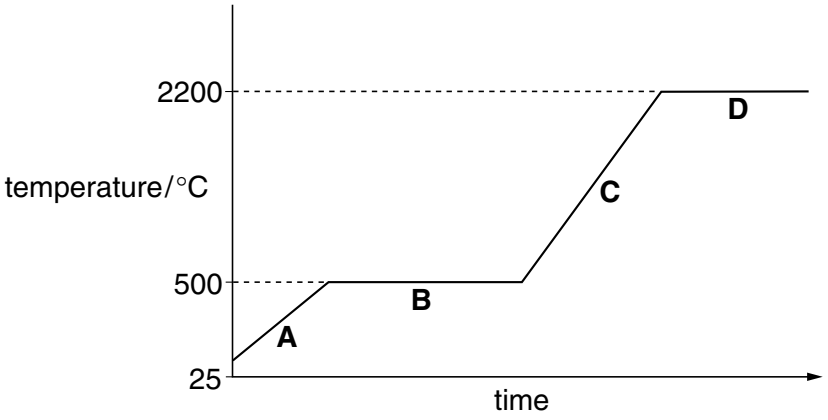
Where do water molecules lose energy?



2 A solid metal is heated until it turns to vapour.

The graph shows the temperature of the metal during this process.

Which part of the graph shows the melting of the metal?



3 Some chemical compounds are purified by recrystallisation.

What can be used to test the purity of the crystals?

A melting point

B colour of crystals

C size of crystals

D solubility

4 What could be the melting point and boiling point of water containing a dissolved impurity?

	melting point / °C	boiling point / °C
A	+3	96
B	+3	104
C	–3	96
D	–3	104

5 Which number in the table is –1?

particle	charge	relative mass
electron	**A**	**B**
neutron	**C**	1
proton	**D**	1

6 What is the electronic structure of an atom with a proton number 5 and a nucleon number 11?

A 1, 8, 2 **B** 2, 8, 1 **C** 2, 3 **D** 3, 2

7 What changes when an ion is made from an atom?

A the number of electrons only

B the number of neutrons only

C the number of protons only

D the number both of protons and of neutrons

8 Strontium, Sr, is a metal that forms an ionic chloride $SrCl_2$.

Sulphur, S, is a non-metal that forms a covalent chloride SCl_2.

Which compound is likely to have the higher melting point (m.p.) and which is more soluble in water?

	higher m.p.	more soluble in water
A	$SrCl_2$	$SrCl_2$
B	$SrCl_2$	SCl_2
C	SCl_2	$SrCl_2$
D	SCl_2	SCl_2

[Turn over

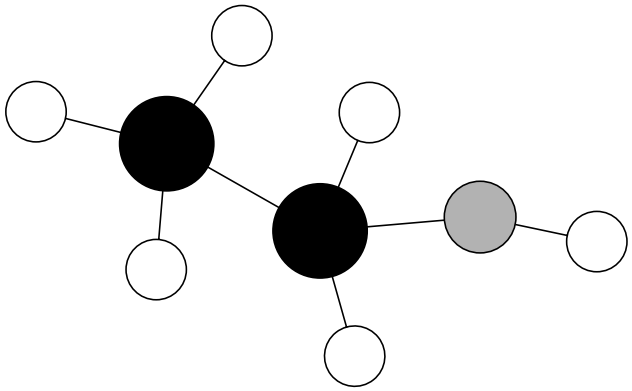
9 The relative atomic mass of oxygen is 16 and that of hydrogen is 1.

This means that …(i)… of oxygen has the same mass as …(ii)… of hydrogen.

Which words correctly complete the gaps?

	gap (i)	gap (ii)
A	an atom	thirty-two molecules
B	an atom	eight molecules
C	a molecule	sixteen atoms
D	a molecule	eight atoms

10 The diagram shows a model of a molecule containing carbon, hydrogen and oxygen.



How many atoms of each element are in the molecule?

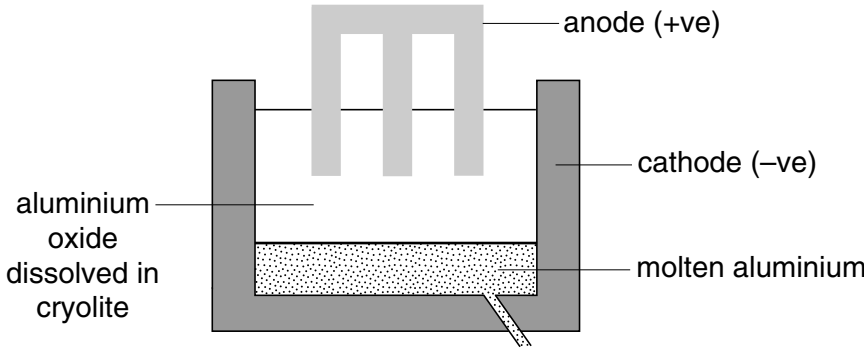
	carbon	hydrogen	oxygen
A	1	6	2
B	2	5	1
C	2	6	1
D	6	2	1

11 Water is formed when 48 g of oxygen combine with 6 g of hydrogen.

What mass of oxygen combines with 2 g of hydrogen?

A 12 g **B** 16 g **C** 96 g **D** 144 g

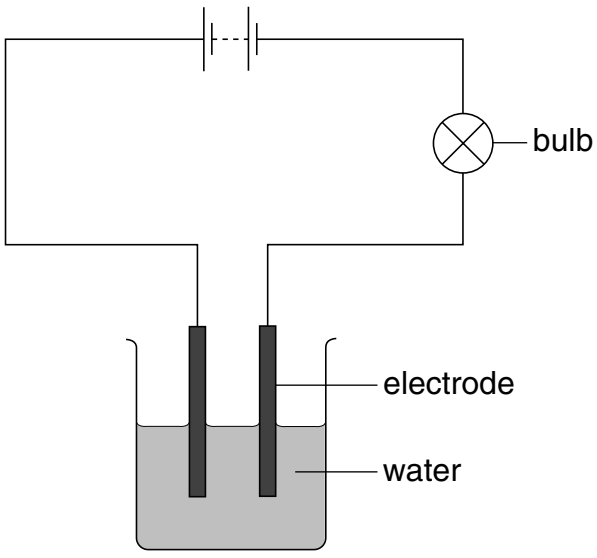
12 The diagram shows how aluminium is manufactured by electrolysis.



What are the anode and cathode made of?

	anode	cathode
A	aluminium	aluminium
B	aluminium	graphite
C	graphite	aluminium
D	graphite	graphite

13 A student sets up the apparatus shown. The bulb does not light.



After the student adds substance **X** to the water, the bulb lights.

What is **X**?

A calcium carbonate

B carbon

C copper(II) sulphate

D ethanol

[Turn over

14 The following elements have radioactive isotopes.

Which element is used as a source of energy because of its radioactivity?

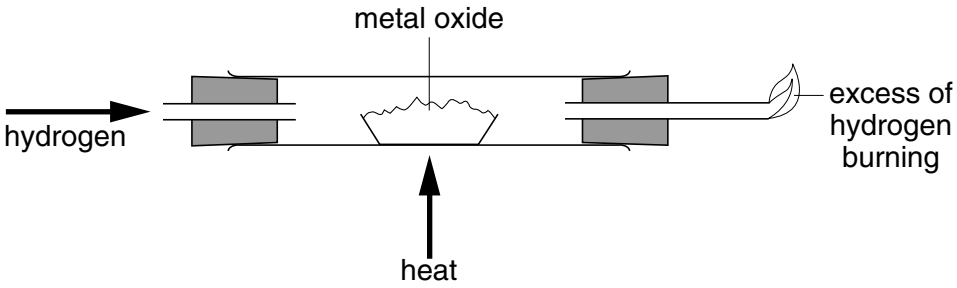
A carbon

B hydrogen

C iodine

D uranium

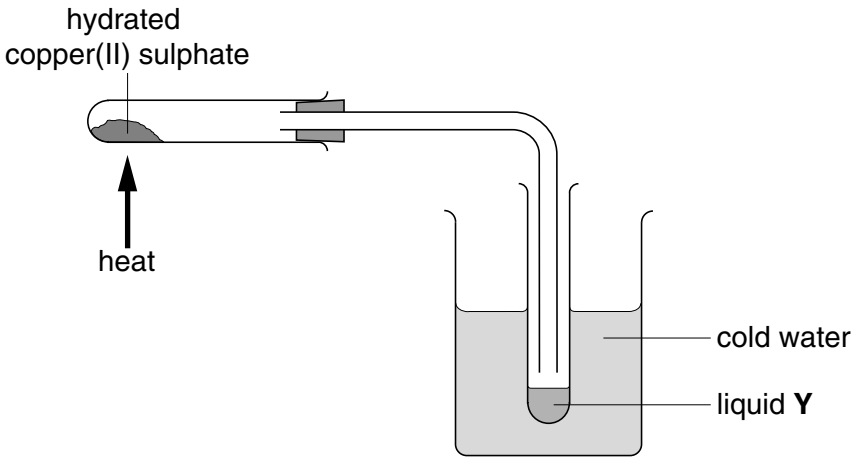
15 When hydrogen is passed over a heated metal oxide, the metal and steam are formed.



What happens to the hydrogen and to the metal oxide?

	hydrogen	metal oxide
A	oxidised	oxidised
B	oxidised	reduced
C	reduced	oxidised
D	reduced	reduced

16 When hydrated copper(II) sulphate is heated in the apparatus shown, solid **X** and liquid **Y** are produced.



Which changes are noticed when liquid **Y** is added to cold solid **X**?

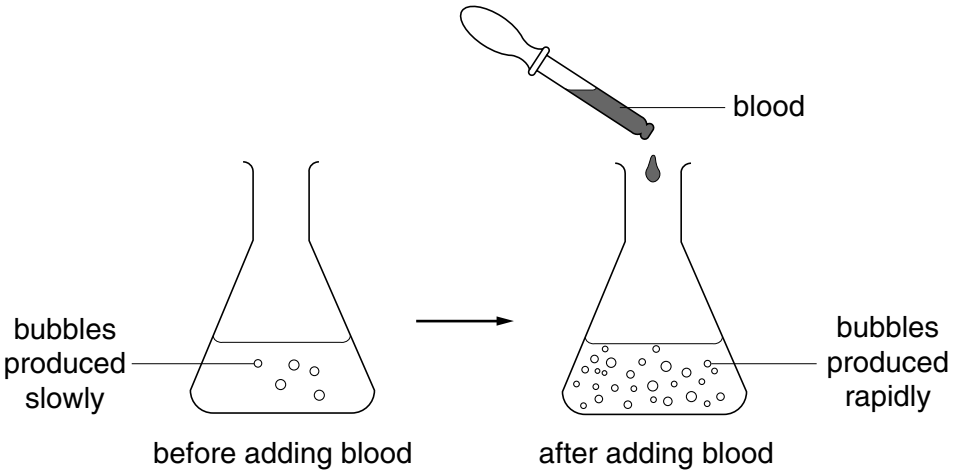
	colour change	heat change
A	blue to white	heat given out
B	blue to white	heat taken in
C	white to blue	heat given out
D	white to blue	heat taken in

[Turn over

17 A solution of hydrogen peroxide releases oxygen slowly at room temperature.

hydrogen peroxide → water + oxygen

The diagrams show the effect of adding blood to the solution.



What could be the reason for the observed change?

A Blood contains an enzyme.

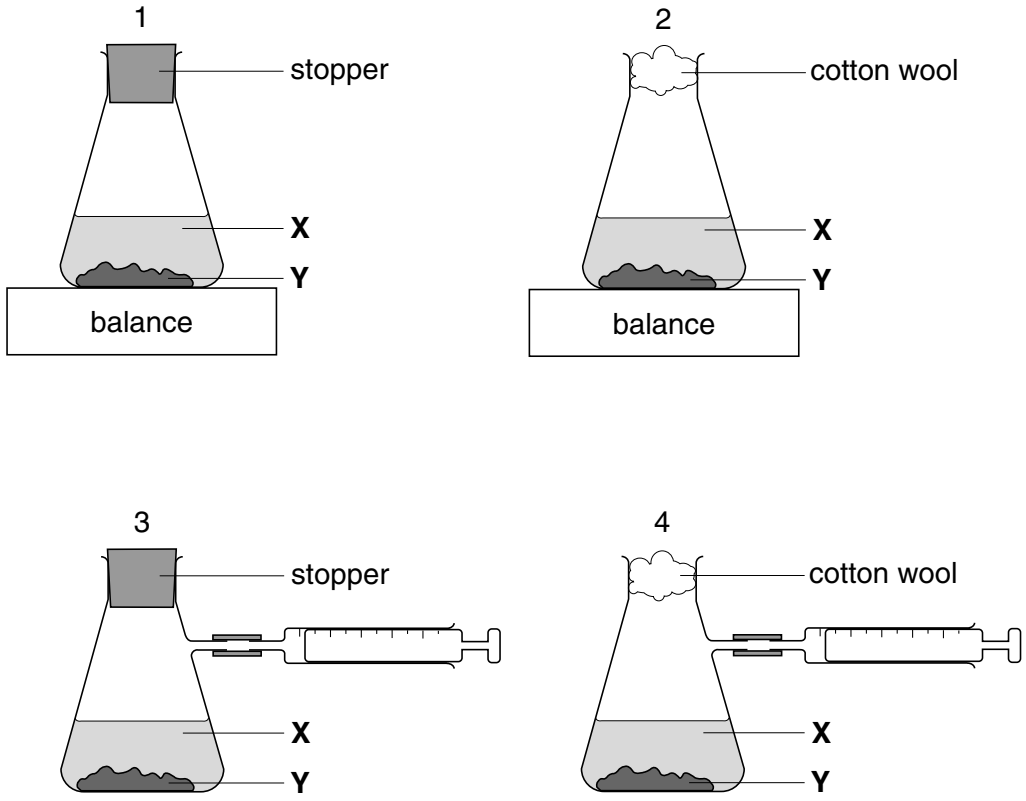
B Blood contains water.

C The hydrogen peroxide becomes more concentrated.

D The hydrogen peroxide is neutralised by blood.

18 A liquid **X** reacts with solid **Y** to form a gas.

Which two diagrams show suitable methods for investigating the speed of the reaction?



A 1 and 3

B 1 and 4

C 2 and 3

D 2 and 4

19 Which substance does **not** form copper(II) sulphate with warm, dilute sulphuric acid?

A copper

B copper(II) carbonate

C copper(II) hydroxide

D copper(II) oxide

20 Which test method and gas are correctly linked?

	test method	gas
A	a lighted splint	oxygen
B	a glowing splint	hydrogen
C	damp litmus paper	chlorine
D	limewater	ammonia

21 Water is added to a test-tube containing dilute sulphuric acid of pH 4.

What could be the pH of the resulting solution?

A 8 **B** 6 **C** 4 **D** 2

22 Magnesium, on the left of Period Two of the Periodic Table, is more metallic than chlorine on the right of this Period.

Why is this?

Magnesium has

A fewer electrons.

B fewer protons.

C fewer full shells of electrons.

D fewer outermost electrons.

23 An inert gas **X** is used to fill weather balloons.

Which descriptions of **X** are correct?

	number of outer electrons in atoms of **X**	structure of gas **X**
A	2	single atoms
B	2	diatomic molecules
C	8	single atoms
D	8	diatomic molecules

24 A student is asked to complete two sentences.

Metallic and non-metallic elements are classified in the …(i)… This can be used to …(ii)… the properties of elements.

Which words correctly complete the gaps?

	gap (i)	gap (ii)
A	Periodic Table	measure
B	Periodic Table	predict
C	reactivity series	measure
D	reactivity series	predict

25 Which material is an alloy that contains a non-metallic element?

A brass

B haematite

C manganese

D steel

26 The table gives information about the reactivity of three metals P, Q and R.

metal	reaction with air	reaction with steam	reaction with dilute hydrochloric acid
P	burns with sparks	forms an oxide	forms hydrogen
Q	slowly forms an oxide	no reaction	no reaction
R	slowly forms an oxide	no reaction	forms hydrogen

What is the order of reactivity of P, Q and R?

	most reactive ⟶		least reactive
A	P	Q	R
B	P	R	Q
C	Q	R	P
D	R	Q	P

[Turn over

27 The bodies of aircraft are often made using aluminium.

Which **two** properties of aluminium make it suitable for this purpose?

	property 1	property 2
A	good conductor of electricity	good conductor of heat
B	good conductor of electricity	strong
C	good conductor of heat	low density
D	strong	low density

28 Which raw materials are used in the manufacture of iron?

A bauxite and lime

B bauxite and limestone

C haematite and lime

D haematite and limestone

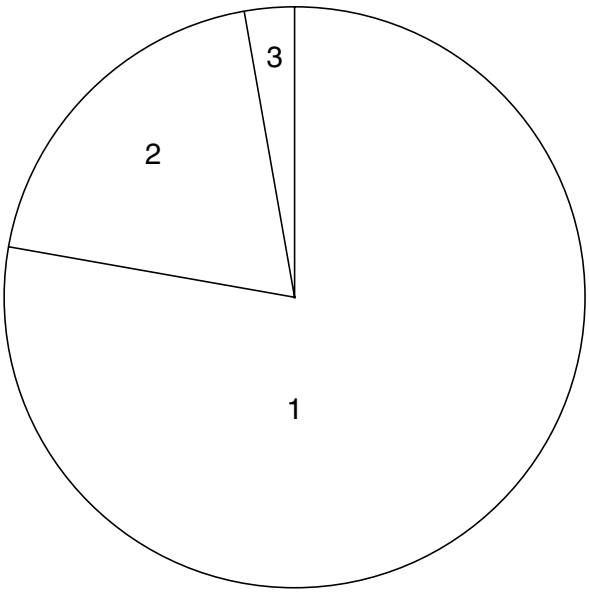
29 In a car industry, approximately 45 000 litres of water are required to produce a single car.

This water does not need to be very pure.

Which purification methods would be suitable and economic to use?

	chlorinated	distilled
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

30 The pie-chart shows the composition of air.



What are the gases in parts 1, 2 and 3 of the pie-chart?

	1	2	3
A	nitrogen	other gases	oxygen
B	nitrogen	oxygen	other gases
C	oxygen	other gases	nitrogen
D	oxygen	nitrogen	other gases

31 A steel works and a chemical works are built near to a city. The limestone buildings in the city begin to crumble.

Which gas is most likely to cause this damage?

A carbon dioxide

B carbon monoxide

C oxygen

D sulphur dioxide

32 Which methods can be used to prevent the rusting of an iron girder of a bridge?

	coat it with grease	electroplate it	paint it
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✓

33 A student heats a mixture of ammonium chloride and calcium hydroxide. She tests the gas given off with damp red litmus paper.

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	red
D	chlorine	white

34 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?

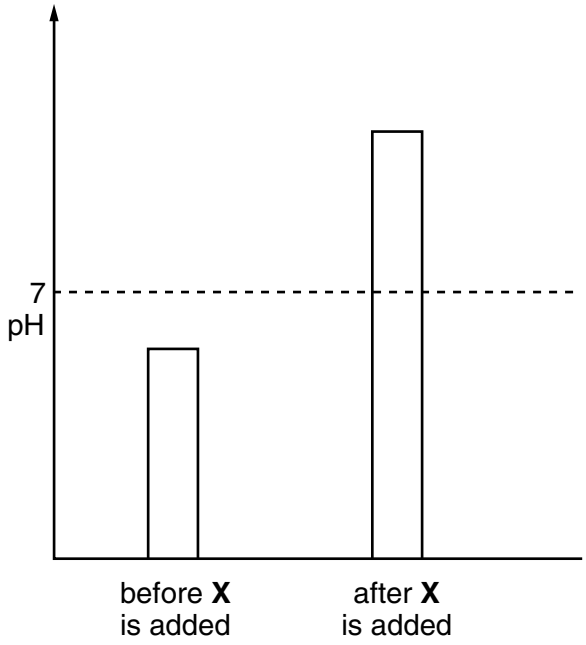
A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

35 The diagram shows how the pH of an industrial waste changes when substance **X** is added to it.



What is substance **X**?

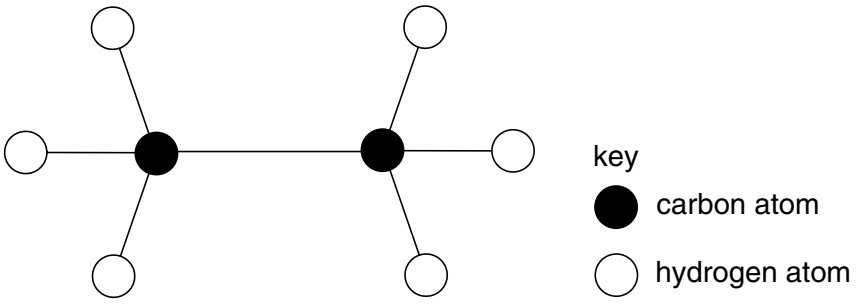
A coal

B lime

C salt

D water

36 The diagram shows a model of an organic compound.



What is the name of this compound?

A ethane

B ethanoic acid

C ethanol

D ethene

[Turn over

37 Bitumen is a substance obtained from the fractional distillation of petroleum.

What are the boiling points and the sizes of the molecules in bitumen?

	boiling points	sizes of molecules
A	high	large
B	high	small
C	low	large
D	low	small

38 Which hydrocarbons in the table are members of the same homologous series?

hydrocarbon	1	2	3	4
state at room temperature	gas	gas	liquid	liquid
reaction with oxygen	burns	burns	burns	burns
aqueous reaction with bromine	decolourises bromine	no reaction	decolourises bromine	no reaction

A 1 and 2

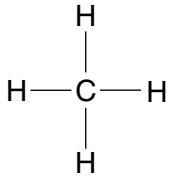
B 1 and 3

C 3 and 4

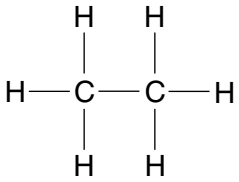
D 1, 2, 3 and 4

39 Which of the molecules shown can be polymerised?

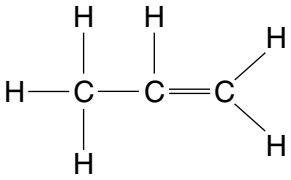
A



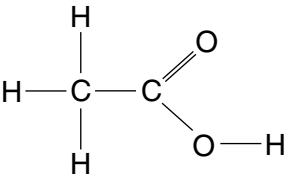
B



C



D



40 Which conditions are necessary to ferment sugar into ethanol?

	yeast	temperature/ °C
A	absent	30
B	absent	70
C	present	30
D	present	70

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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	43 Tc Technetium	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.).