

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CHEMISTRY**

**0620/01**

Paper 1 Multiple Choice

October/November 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 16.

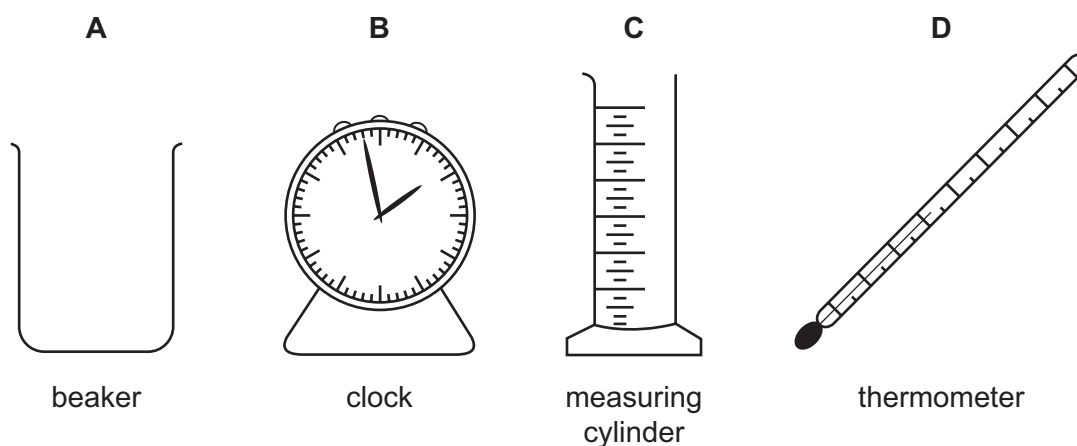
You may use a calculator.

This document consists of **16** printed pages.



- 1 In which change of state do the particles become more widely separated?
- A gas to liquid
  - B gas to solid
  - C liquid to gas
  - D liquid to solid
- 2 A student mixes 25 cm<sup>3</sup> samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide. Each time, the student measures the change in temperature.

Which piece of apparatus is **not** needed?



- 3 Which piece of apparatus should be used for the **accurate** measurement of 30.0 cm<sup>3</sup> of a liquid?
- A a beaker
  - B a burette
  - C a conical flask
  - D a measuring cylinder
- 4 Which number is different for isotopes of the same element?
- A number of electrons
  - B number of full shells
  - C number of nucleons
  - D number of protons

- 5 The table shows the nucleon numbers and proton numbers of some atoms.

nucleon number	35	37	40	39	40
proton number	17	17	18	19	19

How many are atoms of non-metallic elements?

- A 1                      B 2                      C 3                      D 4
- 6 The table shows the electronic structures of four atoms.

atom	electronic structure
W	2,1
X	2,7
Y	2,8,4
Z	2,8,8

Which two atoms combine to form an ionic compound?

- A W and X              B W and Y              C X and Y              D X and Z
- 7 Element X forms an acidic, covalent oxide.

Which row in the table shows how many electrons there could be in the outer shell of an atom of X?

	1	2	6	7
<b>A</b>	✓	x	x	x
<b>B</b>	✓	✓	x	x
<b>C</b>	x	x	x	✓
<b>D</b>	x	x	✓	✓

- 8 Which atom has twice as many neutrons as protons?

- A  ${}^1_1\text{H}$               B  ${}^2_1\text{H}$               C  ${}^3_1\text{H}$               D  ${}^4_2\text{He}$

9 Magnesium and sulphur each form a chloride.

What could be the formulae of these chlorides?

	magnesium	sulphur
<b>A</b>	$Mg_2Cl$	$S_2Cl$
<b>B</b>	$Mg_2Cl$	$SCl_2$
<b>C</b>	$MgCl_2$	$S_2Cl$
<b>D</b>	$MgCl_2$	$SCl_2$

10 A gas has the molecular formula  $NOCl$ .

Which diagram could show molecules of the pure gas  $NOCl$ ?

**A** **B**

key

○ Cl

● N

● O

**C** **D**

11 The electrolysis of concentrated aqueous sodium chloride makes three products.

Which products are shown at the correct electrodes?

	anode (+ve)	cathode (-ve)
<b>A</b>	chlorine	sodium hydroxide
<b>B</b>	sodium hydroxide	chlorine
<b>C</b>	hydrogen	sodium
<b>D</b>	sodium	hydrogen

12 Aluminium is extracted from its oxide by electrolysis. To do so, the oxide is dissolved.

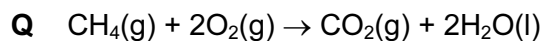
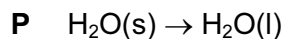
Which substance is used to dissolve aluminium oxide and where is aluminium deposited during the electrolysis?

	substance used to dissolve aluminium oxide	where aluminium is deposited
<b>A</b>	cryolite	anode (+ve)
<b>B</b>	cryolite	cathode (-ve)
<b>C</b>	water	anode (+ve)
<b>D</b>	water	cathode (-ve)

13 Which piece of apparatus is essential to measure the speed of a reaction?

- A** accurate balance
- B** gas syringe
- C** stopwatch
- D** thermometer

14 Equations for two changes **P** and **Q** are shown.



Which of these changes are exothermic?

	<b>P</b>	<b>Q</b>
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

15 The decomposition of glucose, in aqueous solution, to form ethanol and carbon dioxide is catalysed by an enzyme in yeast.

Which change increases the rate of this decomposition?

- A** add more water to the solution
- B** cool the solution
- C** heat the solution to boiling point
- D** heat the solution to 30 °C

16 Which equation shows an oxidation reaction?

- A**  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- B**  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- C**  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
- D**  $\text{N}_2\text{O}_4 \rightarrow 2\text{NO}_2$

17 Acids react with bases, carbonates and metals.

Which of these reactions produce a gas?

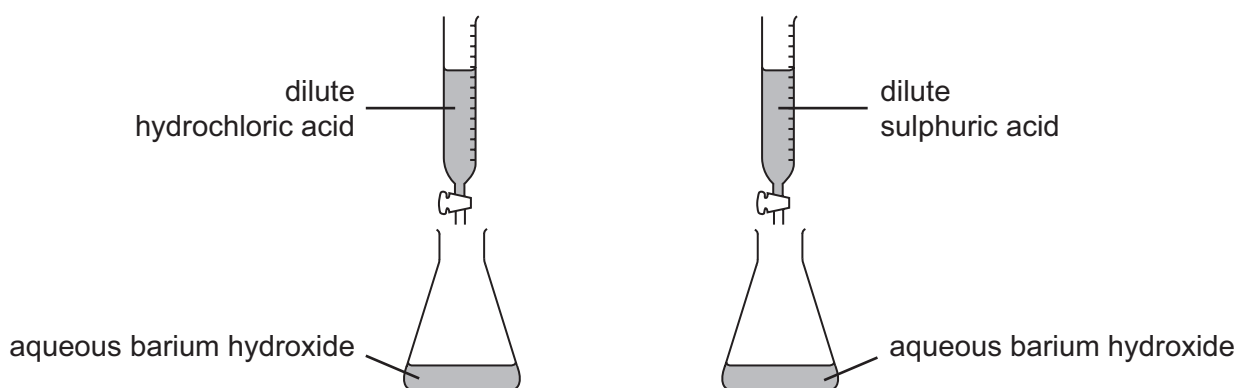
	reaction of acid with a		
	base	carbonate	metal
<b>A</b>	✓	✓	✓
<b>B</b>	✓	x	x
<b>C</b>	x	✓	✓
<b>D</b>	x	✓	x

18 Which properties does an acid have?

- 1 reacts with ammonium sulphate 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 The diagrams show two experiments, one to make barium chloride and the other to make barium sulphate.

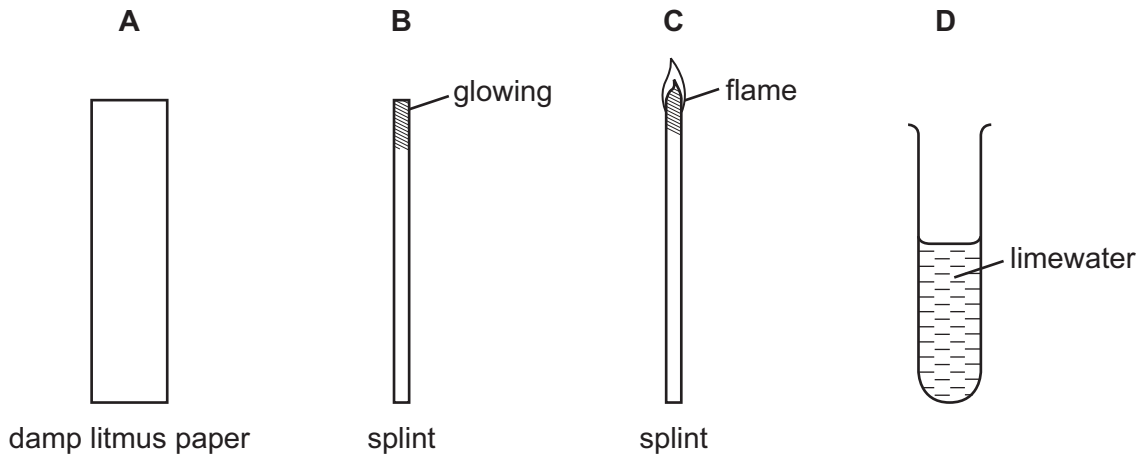


In each experiment, the acid is run into the conical flask until the resulting liquid has pH7.

What are the next steps to obtain samples of the solid salts?

	barium chloride	barium sulphate
<b>A</b>	crystallisation	crystallisation
<b>B</b>	crystallisation	filtration
<b>C</b>	filtration	crystallisation
<b>D</b>	filtration	filtration

20 Which piece of equipment can be used to show that a gas is hydrogen?



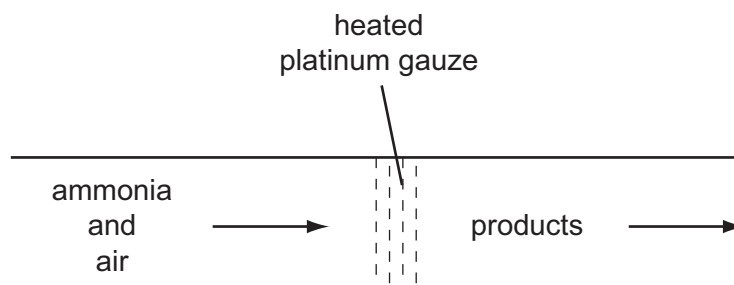
21 The statements are about metals and their oxides.

Metals ...X... electrons to form ions. The oxides of metals are ...Y....

Which words correctly complete the statements?

	X	Y
<b>A</b>	gain	acidic
<b>B</b>	gain	basic
<b>C</b>	lose	acidic
<b>D</b>	lose	basic

22 The diagram shows one stage in the manufacture of nitric acid from ammonia.



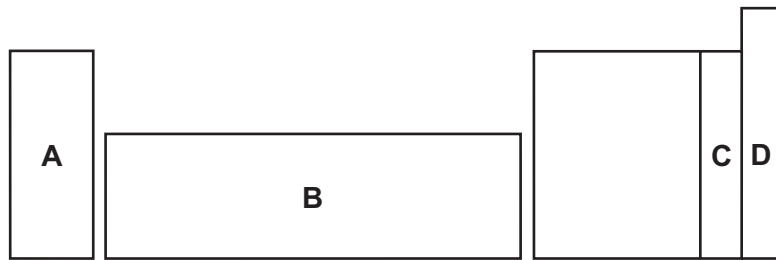
What could be the use of the platinum gauze in this process?

- A** as a base
- B** as a catalyst
- C** as a filter
- D** as a fuel



23 An element does not conduct electricity but it does exist as diatomic molecules.

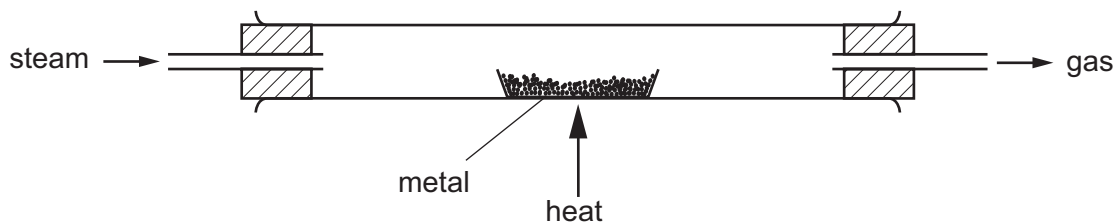
In which area of the Periodic Table is the element to be found?



24 Which properties of helium explain its use in filling balloons?

	low density	its unreactivity
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

25 The diagram shows apparatus used to test the reactivity of calcium, copper and magnesium with steam.



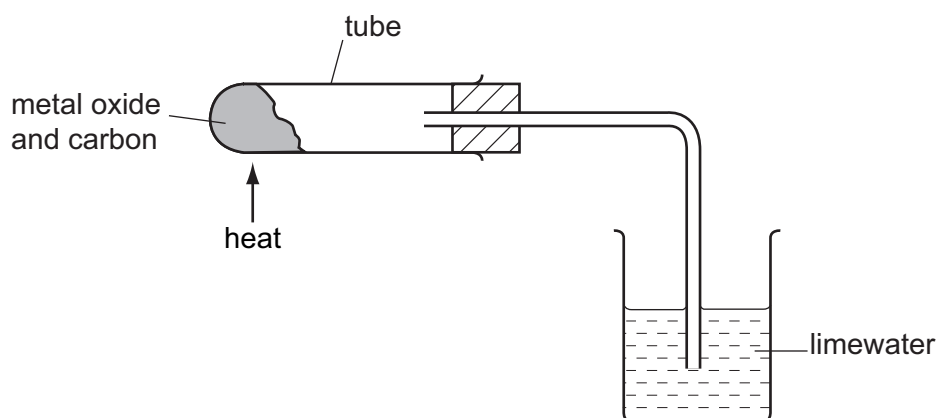
Which metals react with steam to form hydrogen?

	calcium	copper	magnesium
<b>A</b>	✓	✓	x
<b>B</b>	✓	x	✓
<b>C</b>	x	✓	x
<b>D</b>	x	x	✓

26 Which types of steel are used in chemical plants and machinery?

	chemical plant	machinery
<b>A</b>	mild steel	mild steel
<b>B</b>	mild steel	stainless steel
<b>C</b>	stainless steel	mild steel
<b>D</b>	stainless steel	stainless steel

27 In separate experiments, mixtures of CuO/C and of MgO/C are strongly heated in the apparatus shown.



What happens to the limewater in these experiments?

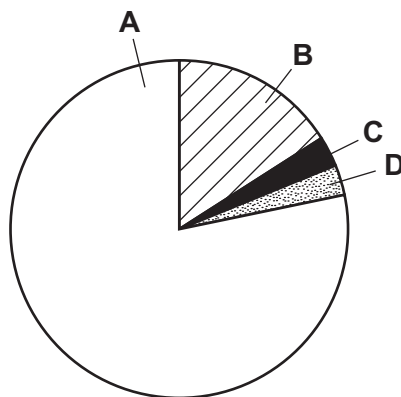
	CuO/C	MgO/C
<b>A</b>	goes cloudy	goes cloudy
<b>B</b>	goes cloudy	stays clear
<b>C</b>	stays clear	goes cloudy
<b>D</b>	stays clear	stays clear

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

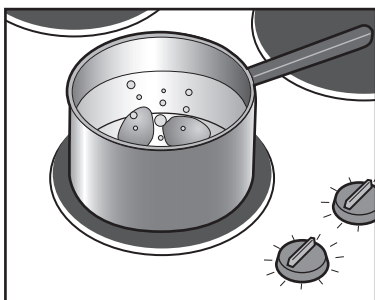
- A** bauxite and lime
- B** bauxite and limestone
- C** hematite and lime
- D** hematite and limestone

29 The diagram represents the composition of dry air.

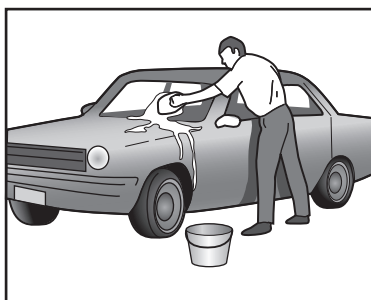
Which part shows the percentage of nitrogen in the air?



30 The diagram shows some uses of water in the home.



1



2



3

For which of these uses is it important for the water to have been purified?

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

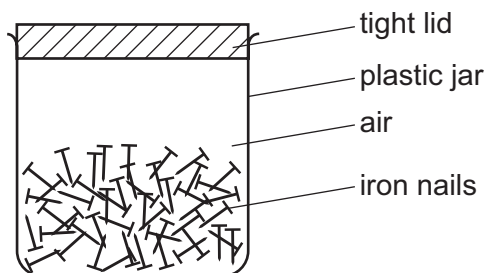
31 The listed pollutants are sometimes found in car exhaust fumes.

- 1 carbon monoxide
- 2 nitrogen oxides
- 3 sulphur dioxide

Which of these pollutants are products of the combustion of the fuel?

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

32 A shopkeeper stores iron nails in an airtight container, as shown in the diagram.



The nails begin to rust after a few days.

How can the rusting of the nails be prevented?

- A leave the lid off
- B put a drying agent in the jar
- C put the jar in a warm place
- D seal the jar in a bag

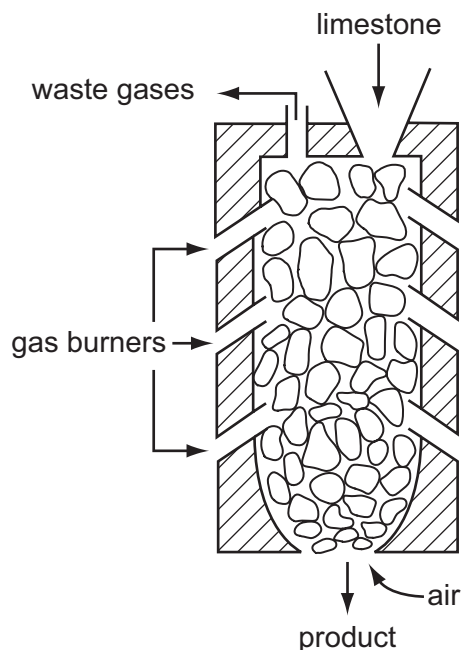
33 Two uses of oxygen are

- 1 burning acetylene in welding,
- 2 helping the breathing of hospital patients.

Which of these uses form carbon dioxide?

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

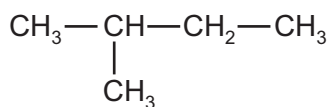
34 The diagram shows a kiln used to heat limestone.



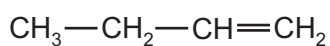
What is the product and what waste gas is formed?

	product	waste gas
<b>A</b>	lime	carbon monoxide
<b>B</b>	lime	carbon dioxide
<b>C</b>	slaked lime	carbon monoxide
<b>D</b>	slaked lime	carbon dioxide

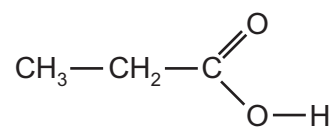
35 The structures of three compounds are shown.



**X**



**Y**



**Z**

What are **X**, **Y** and **Z**?

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A</b>	alkane	alkene	alcohol
<b>B</b>	alkane	alkene	carboxylic acid
<b>C</b>	alkene	alkane	alcohol
<b>D</b>	alkene	alkane	carboxylic acid

36 How many oxygen atoms and double bonds are there in one molecule of ethanoic acid?

	number of oxygen atoms	number of double bonds
<b>A</b>	1	0
<b>B</b>	1	1
<b>C</b>	2	0
<b>D</b>	2	1

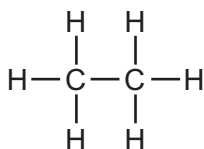
37 Compounds R and S occur naturally.

R is  $C_6H_{14}$  and S is  $C_6H_{12}O_6$ .

Which of the terms **hydrocarbon** and **occurs in crude oil** describe R and S?

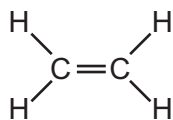
	hydrocarbon	occurs in crude oil
<b>A</b>	R only	R only
<b>B</b>	R only	S only
<b>C</b>	S only	R only
<b>D</b>	S only	S only

38 The diagram shows an ethane molecule.

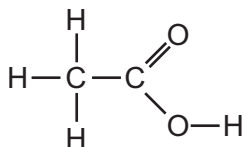


Which compound has chemical properties similar to those of ethane?

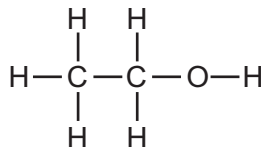
**A**



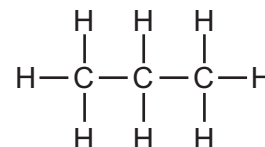
**B**



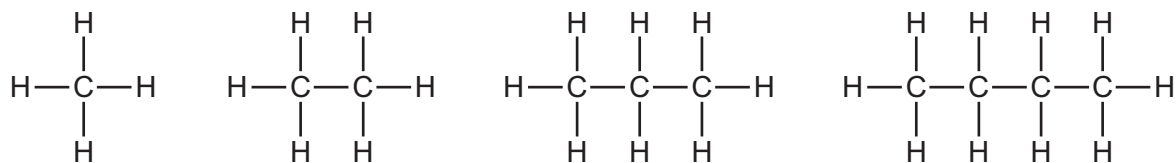
**C**



**D**



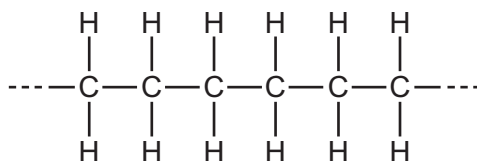
39 The diagram shows the first four members of a homologous series.



What is the difference in molecular formula between one member and the next in the series?

- A** CH                      **B** CH<sub>2</sub>                      **C** CH<sub>3</sub>                      **D** CH<sub>4</sub>

40 The diagram shows part of a polymer.



Which compound is used as the monomer?

- A** C<sub>2</sub>H<sub>4</sub>  
**B** C<sub>2</sub>H<sub>6</sub>  
**C** C<sub>6</sub>H<sub>12</sub>  
**D** C<sub>6</sub>H<sub>14</sub>

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

		Group																								
		I	II	III	IV	V	VI	VII	VIII	IX	X	0														
		<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">1 <b>H</b> Hydrogen 1</td> </tr> </table>											1 <b>H</b> Hydrogen 1													
1 <b>H</b> Hydrogen 1																										
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											4 <b>He</b> Helium 2														
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	13 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulphur 16	17 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10															
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	27 <b>Co</b> Cobalt 27	28 <b>Ni</b> Nickel 28	29 <b>Cu</b> Copper 29	30 <b>Zn</b> Zinc 30	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36															
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	57 <b>Co</b> Cobalt 27	58 <b>Ni</b> Nickel 28	59 <b>Cu</b> Copper 29	60 <b>Zn</b> Zinc 30	61 <b>Ga</b> Gallium 31	62 <b>Ge</b> Germanium 32	63 <b>As</b> Arsenic 33	64 <b>Se</b> Selenium 34	65 <b>Kr</b> Krypton 36														
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	91 <b>Zr</b> Zirconium 40	92 <b>Nb</b> Niobium 41	93 <b>Ta</b> Tantalum 73	94 <b>Hf</b> Hafnium 72	95 <b>Y</b> Yttrium 39	96 <b>Zr</b> Zirconium 40	97 <b>Nb</b> Niobium 41	98 <b>Ta</b> Tantalum 73	99 <b>Hf</b> Hafnium 72	100 <b>La</b> Lanthanum 57	101 <b>Ce</b> Cerium 58														
226 <b>Fr</b> Francium 87	227 <b>Ra</b> Radium 88	106 <b>Pd</b> Palladium 46	107 <b>Ag</b> Silver 47	108 <b>Cd</b> Cadmium 48	109 <b>In</b> Indium 49	110 <b>Tl</b> Thallium 81	111 <b>Pb</b> Lead 82	112 <b>Hg</b> Mercury 80	113 <b>Tl</b> Thallium 81	114 <b>Pb</b> Lead 82	115 <b>Bi</b> Bismuth 83	116 <b>Po</b> Polonium 84														
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">140 <b>Ce</b> Cerium 58</td> <td style="padding: 2px;">141 <b>Pr</b> Praseodymium 59</td> <td style="padding: 2px;">142 <b>Nd</b> Neodymium 60</td> <td style="padding: 2px;">143 <b>Pm</b> Promethium 61</td> <td style="padding: 2px;">144 <b>Sm</b> Samarium 62</td> <td style="padding: 2px;">145 <b>Eu</b> Europium 63</td> <td style="padding: 2px;">146 <b>Gd</b> Gadolinium 64</td> <td style="padding: 2px;">147 <b>Tb</b> Terbium 65</td> <td style="padding: 2px;">148 <b>Dy</b> Dysprosium 66</td> <td style="padding: 2px;">149 <b>Ho</b> Holmium 67</td> <td style="padding: 2px;">150 <b>Er</b> Erbium 68</td> <td style="padding: 2px;">151 <b>Tm</b> Thulium 69</td> <td style="padding: 2px;">152 <b>Yb</b> Ytterbium 70</td> <td style="padding: 2px;">153 <b>Lu</b> Lutetium 71</td> </tr> </table>													140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71
140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71													
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">232 <b>Th</b> Thorium 90</td> <td style="padding: 2px;">233 <b>Pa</b> Protactinium 91</td> <td style="padding: 2px;">234 <b>U</b> Uranium 92</td> <td style="padding: 2px;">235 <b>Np</b> Neptunium 93</td> <td style="padding: 2px;">236 <b>Pu</b> Plutonium 94</td> <td style="padding: 2px;">237 <b>Am</b> Americium 95</td> <td style="padding: 2px;">238 <b>Cm</b> Curium 96</td> <td style="padding: 2px;">239 <b>Bk</b> Berkelium 97</td> <td style="padding: 2px;">240 <b>Cf</b> Californium 98</td> <td style="padding: 2px;">241 <b>Es</b> Einsteinium 99</td> <td style="padding: 2px;">242 <b>Fm</b> Fermium 100</td> <td style="padding: 2px;">243 <b>Md</b> Mendelevium 101</td> <td style="padding: 2px;">244 <b>No</b> Nobelium 102</td> <td style="padding: 2px;">245 <b>Lr</b> Lawrencium 103</td> </tr> </table>													232 <b>Th</b> Thorium 90	233 <b>Pa</b> Protactinium 91	234 <b>U</b> Uranium 92	235 <b>Np</b> Neptunium 93	236 <b>Pu</b> Plutonium 94	237 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	239 <b>Bk</b> Berkelium 97	240 <b>Cf</b> Californium 98	241 <b>Es</b> Einsteinium 99	242 <b>Fm</b> Fermium 100	243 <b>Md</b> Mendelevium 101	244 <b>No</b> Nobelium 102	245 <b>Lr</b> Lawrencium 103
232 <b>Th</b> Thorium 90	233 <b>Pa</b> Protactinium 91	234 <b>U</b> Uranium 92	235 <b>Np</b> Neptunium 93	236 <b>Pu</b> Plutonium 94	237 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	239 <b>Bk</b> Berkelium 97	240 <b>Cf</b> Californium 98	241 <b>Es</b> Einsteinium 99	242 <b>Fm</b> Fermium 100	243 <b>Md</b> Mendelevium 101	244 <b>No</b> Nobelium 102	245 <b>Lr</b> Lawrencium 103													
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;"><b>X</b></td> <td style="padding: 2px;">b</td> </tr> </table>													a	<b>X</b>	b											
a	<b>X</b>	b																								
<p>*58-71 Lanthanoid series †90-103 Actinoid series</p> <p>a = relative atomic mass X = atomic symbol b = proton (atomic) number</p>																										

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.