

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CHEMISTRY**

**0620/01**

Paper 1 Multiple Choice

May/June 2005

**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.

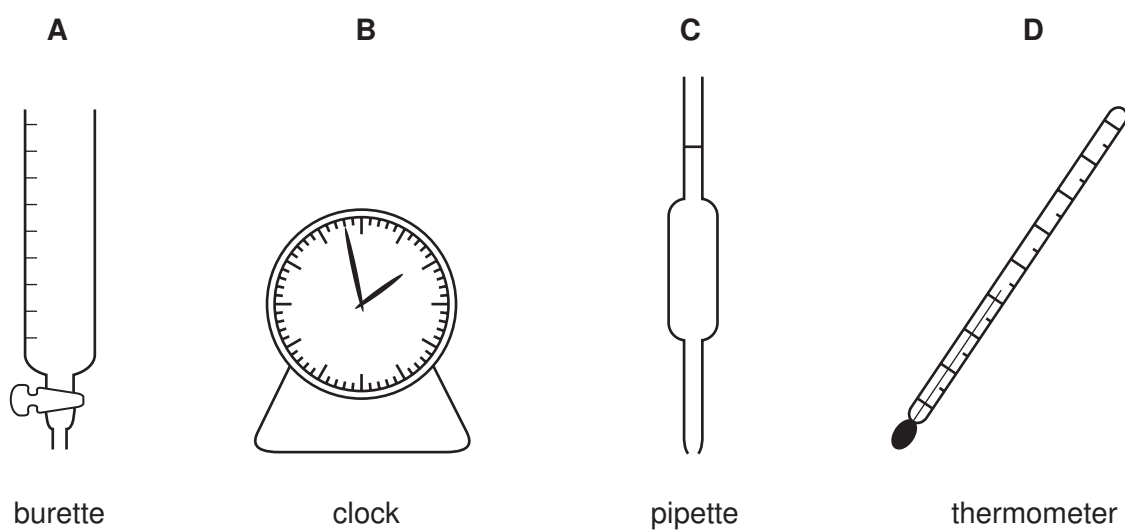
You may use a calculator.

This document consists of **15** printed pages and **1** blank page.



- 1 In which of the following are the particles arranged in a regular pattern?
- A a gas
  - B a liquid
  - C a metal
  - D a solution
- 2 A student mixes  $25 \text{ cm}^3$  samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide. Each time, the student measures the change in temperature to test if the reaction is exothermic.

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



- 3 In an experiment, a student needs to measure out  $36.50 \text{ cm}^3$  of a solution.

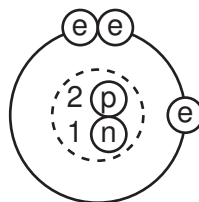
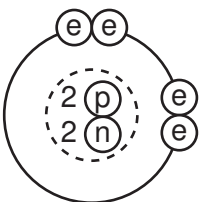
Which piece of apparatus would measure this volume most accurately?

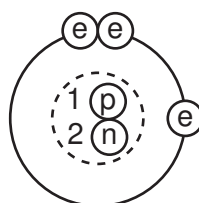
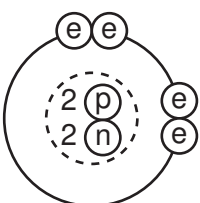
- A beaker
- B burette
- C measuring cylinder
- D pipette

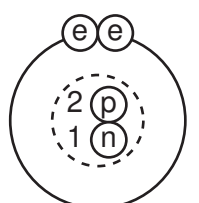
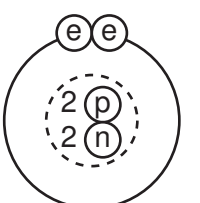
- 4 Two isotopes of helium are  ${}^3_2\text{He}$  and  ${}^4_2\text{He}$ .

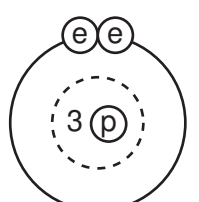
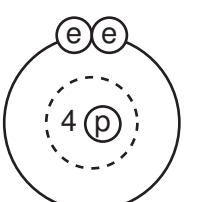
Which two diagrams show the arrangement of particles in these two isotopes?

${}^3_2\text{He}$                        ${}^4_2\text{He}$

**A**  

**B**  

**C**  

**D**  

key  
 (e) electron  
 (p) proton  
 (n) neutron  
 (---) nucleus

- 5 Which row gives the outer electronic shell of fluorine and of neon?

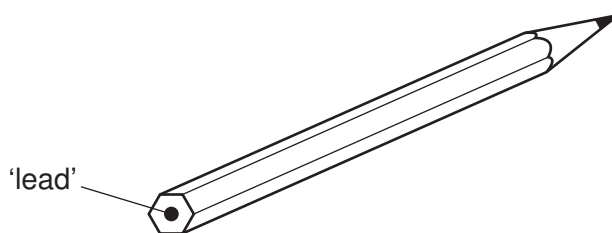
	${}^9\text{F}$	${}^{10}\text{Ne}$
<b>A</b>	7	8
<b>B</b>	7	10
<b>C</b>	9	8
<b>D</b>	9	10

- 6 The electronic configuration of an ion is 2.8.8.

What could this ion be?

	$S^{2-}$	$Ca^{2+}$
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

- 7 The 'lead' in a pencil is made of a mixture of graphite and clay.



If the percentage of graphite is increased, the pencil slides across the paper more easily.

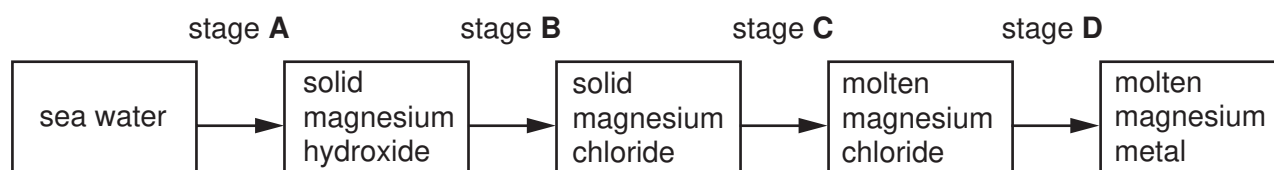
Why is this?

- A** Graphite conducts electricity.
  - B** Graphite is a form of carbon.
  - C** Graphite is a lubricant.
  - D** Graphite is a non-metal.
- 8 Which statement about gaseous hydrogen chloride and solid potassium chloride is correct?
- A** Hydrogen chloride is covalent but potassium chloride is ionic.
  - B** Hydrogen chloride is ionic but potassium chloride is covalent.
  - C** They are both covalent compounds.
  - D** They are both ionic compounds.
- 9 Which two elements form an alloy when they are heated together?
- A** chlorine and hydrogen
  - B** chlorine and zinc
  - C** copper and hydrogen
  - D** copper and zinc

10 For which compound is the formula correct?

	compound	formula
<b>A</b>	ammonia	$\text{NH}_4$
<b>B</b>	carbon monoxide	$\text{CO}_2$
<b>C</b>	iron(III) oxide	$\text{Fe}_3\text{O}_2$
<b>D</b>	zinc hydroxide	$\text{Zn}(\text{OH})_2$

11 At which stage in the manufacture of magnesium from sea-water can electrolysis be used?



12 Metallic and non-metallic elements can both be extracted by electrolysis.

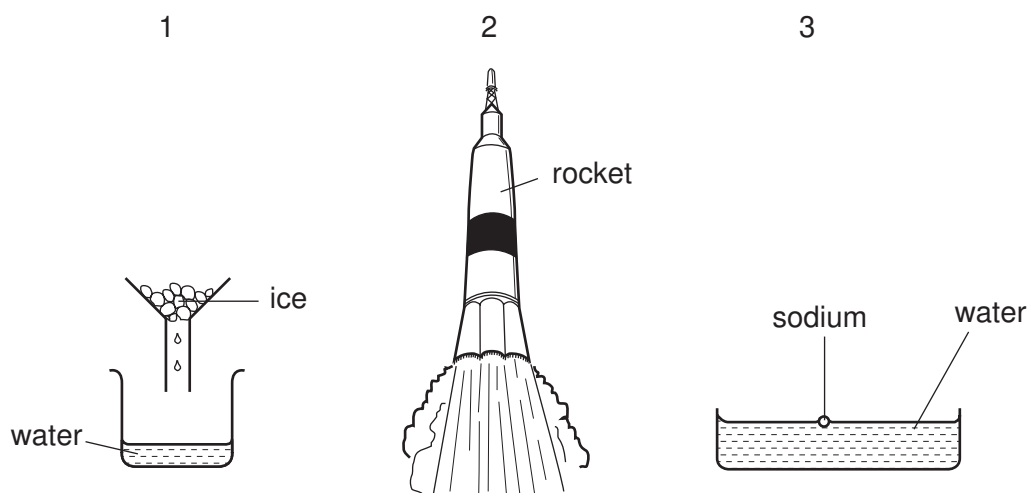
Which element is produced at the negative electrode (cathode)?

- A** bromine
- B** chlorine
- C** hydrogen
- D** oxygen

13 Which product is manufactured by electrolysis?

- A** aluminium
- B** copper(II) sulphate
- C** sodium chloride
- D** steel

14 Which diagrams show a process in which an exothermic change is taking place?



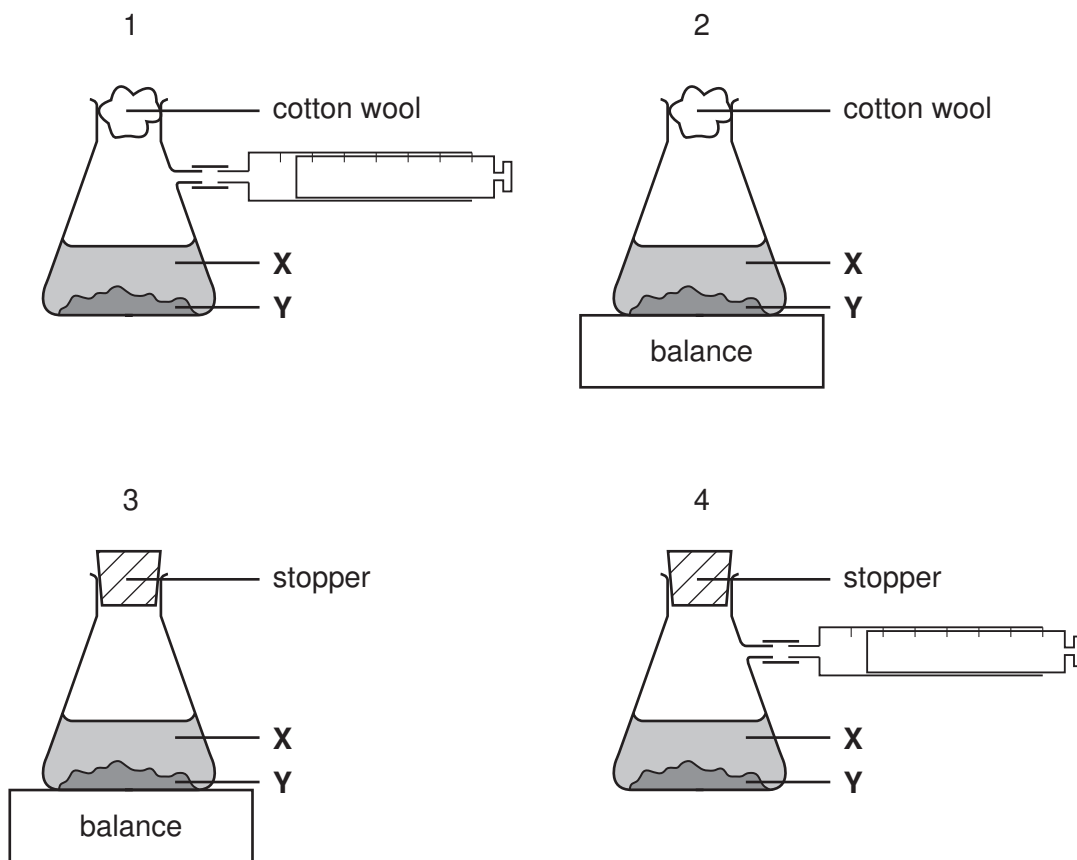
- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

15 Are hydrogen and uranium oxidised when used as a source of energy?

	hydrogen	uranium
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

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

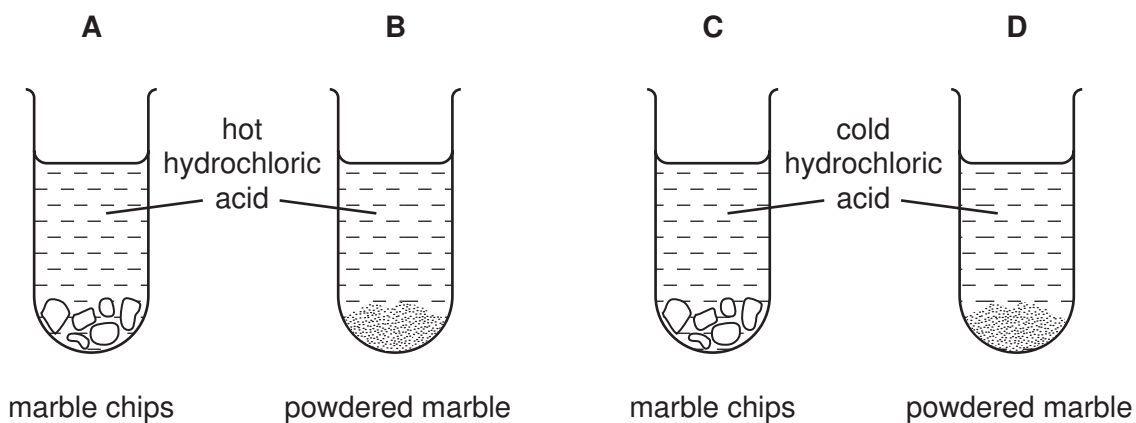
Which **two** diagrams show suitable methods for investigating the speed of the reaction?



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

17 In different experiments, 2g of marble are added to 10 cm<sup>3</sup> of hydrochloric acid.

In which tube is the reaction fastest?



18 What is the colour of liquid bromine and of the aqueous bromide ion?

	bromine	bromide ion
<b>A</b>	red-brown	red-brown
<b>B</b>	red-brown	colourless
<b>C</b>	yellow-green	yellow-green
<b>D</b>	yellow-green	colourless

19 Which property does hydrochloric acid have?

- A** It gives a pale blue precipitate with aqueous copper(II) sulphate.
- B** It gives a white precipitate with aqueous barium nitrate.
- C** It releases ammonia from aqueous ammonium sulphate.
- D** It releases hydrogen with zinc powder.

20 Hydrochloric acid is used to clean a metal surface by removing the oxide layer on the metal.

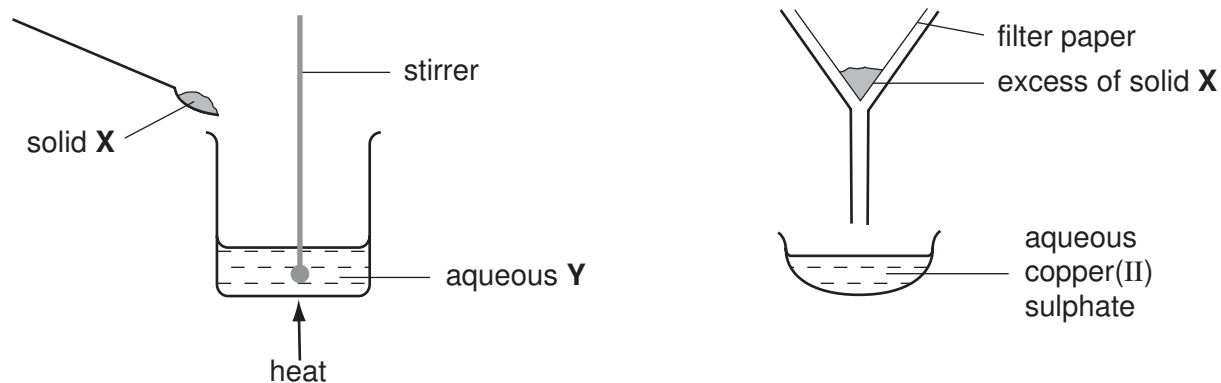
This is because hydrochloric acid has a .....**X**..... pH and the metal oxide is .....**Y**.....

What are **X** and **Y**?

	<b>X</b>	<b>Y</b>
<b>A</b>	high	acidic
<b>B</b>	high	basic
<b>C</b>	low	acidic
<b>D</b>	low	basic



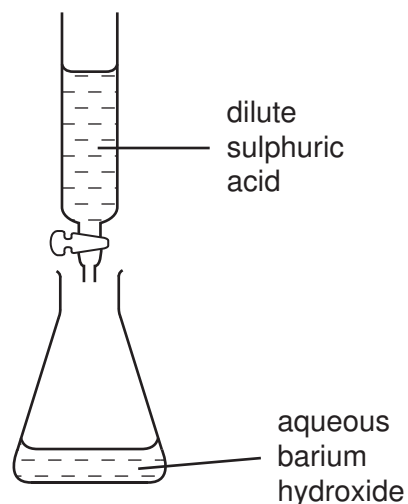
21 The apparatus shown can be used to prepare aqueous copper(II) sulphate.



What are substances **X** and **Y**?

	substance <b>X</b>	substance <b>Y</b>
<b>A</b>	copper	iron(II) sulphate
<b>B</b>	copper(II) chloride	sulphuric acid
<b>C</b>	copper(II) oxide	sulphuric acid
<b>D</b>	sulphur	copper(II) chloride

22 In the experiment shown, the dilute sulphuric acid is run into the flask of aqueous barium hydroxide until the reaction is complete.



Which processes occur in this reaction?

	neutralisation	precipitation
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

23 The chemical properties of an element depend mainly on the number of

- A electrons in the innermost shell.
- B electrons in the outermost shell.
- C fully occupied shells of electrons.
- D partly occupied shells of electrons.

24 An element **X** is in Group III of the Periodic Table.

Which property of **X** can be predicted from this fact?

- A the charge on an ion of **X**
- B the colour of the ion of **X**
- C the melting point of **X**
- D the relative atomic mass,  $A_r$ , of **X**

25 The table compares the properties of Group I elements with those of transition elements.

Which entry in the table is correct?

	property	Group I elements	transition elements
<b>A</b>	catalytic activity	low	high
<b>B</b>	density	high	low
<b>C</b>	electrical conductivity	low	high
<b>D</b>	melting point	high	low

26 Caesium is near the bottom of Group I of the Periodic Table.

What is the correct description of caesium?

	state at room temperature	reaction with cold water
<b>A</b>	liquid	reacts quickly
<b>B</b>	liquid	reacts slowly
<b>C</b>	solid	reacts quickly
<b>D</b>	solid	reacts slowly

27 Mild steel is an alloy of iron and carbon.

How does the carbon affect the properties of mild steel?

- A The carbon makes the alloy a better conductor of electricity than iron.
- B The carbon makes the alloy harder than the iron.
- C The carbon makes the alloy softer than the iron.
- D The carbon stops the iron rusting.

28 Which metal reacts quickly with cold water only when it is finely powdered?

- A calcium
- B copper
- C sodium
- D magnesium

29 Which of the oxides CaO, CuO and Na<sub>2</sub>O can be reduced by heating with carbon?

- A CaO only
- B CuO only
- C Na<sub>2</sub>O only
- D CaO, CuO and Na<sub>2</sub>O

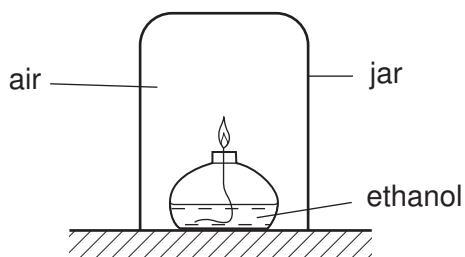
30 Three stages in making steel from iron ore are listed.

- X carbon dioxide reacts with carbon
- Y basic oxides and oxygen are added
- Z hematite is reduced

In which order do these stages occur?

- A X → Y → Z
- B X → Z → Y
- C Y → X → Z
- D Z → Y → X

31 The diagram shows ethanol burning inside a sealed jar.



The mass of one gas in the jar does not change.

Which gas is this?

- A carbon dioxide
- B nitrogen
- C oxygen
- D water vapour

32 Which methods prevent rusting of iron?

	coating with zinc	painting	washing with distilled water
<b>A</b>	✓	✓	✓
<b>B</b>	x	✓	✓
<b>C</b>	✓	✓	x
<b>D</b>	✓	x	x

33 Which processes do **not** use oxygen?

- 1 burning natural gas
- 2 heating a room with an electric fire
- 3 welding apparatus

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

34 The presence of nitrates in soil can be shown by warming the soil with aqueous sodium hydroxide and aluminium foil.

Which gas is given off?

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

35 Dolomite is a rock that contains magnesium carbonate.

A piece of dolomite is heated strongly in air.

Which word equation correctly describes the reaction that takes place?

- A magnesium carbonate + water  $\rightarrow$  magnesium hydroxide + carbon dioxide
- B magnesium carbonate + oxygen  $\rightarrow$  magnesium oxide + carbon dioxide + water
- C magnesium carbonate + oxygen  $\rightarrow$  magnesium oxide + water
- D magnesium carbonate  $\rightarrow$  magnesium oxide + carbon dioxide

36 Which two compounds have molecules in which there is a double bond?

- A ethane and ethanoic acid
- B ethane and ethanol
- C ethene and ethanoic acid
- D ethene and ethanol

37 Which substance is found in crude oil?

- A bitumen
- B ethanol
- C ethanoic acid
- D poly(ethene)

38 Which statement about a family of organic compounds describes an homologous series?

All compounds in the family have the same

- A functional group.
- B physical properties.
- C relative molecular mass.
- D structural formula.

39 Which column describes ethane and which column describes ethene?

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

- A 1 (ethane) and 2 (ethene)
- B 1 (ethane) and 3 (ethene)
- C 2 (ethene) and 3 (ethane)
- D 3 (ethane) and 4 (ethene)

40 Which of the products  $C_{12}H_{24}$  and  $H_2$  could be formed by cracking dodecane,  $C_{12}H_{26}$ ?

	$C_{12}H_{24}$	$H_2$
A	x	x
B	x	✓
C	✓	x
D	✓	✓



## DATA SHEET

### The Periodic Table of the Elements

Group																		
I	II											III	IV	V	VI	VII	0	
												1 <b>H</b> Hydrogen 1						4 <b>He</b> Helium 2
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10	
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12											27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulphur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18	
39 <b>K</b> Potassium 19	40 <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 <b>Rb</b> Rubidium 37	88 <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	<b>Tc</b> Technetium 43	101 <b>Ru</b> Ruthenium 44	103 <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	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54	
133 <b>Cs</b> Caesium 55	137 <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	186 <b>Re</b> Rhenium 75	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	<b>Po</b> Polonium 84	<b>At</b> Astatine 85	<b>Rn</b> Radon 86	
<b>Fr</b> Francium 87	226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																
*58-71 Lanthanoid series			140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	<b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	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		
90-103 Actinoid series			232 <b>Th</b> Thorium 90	<b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	<b>Np</b> Neptunium 93	<b>Pu</b> Plutonium 94	<b>Am</b> Americium 95	<b>Cm</b> Curium 96	<b>Bk</b> Berkelium 97	<b>Cf</b> Californium 98	<b>Es</b> Einsteinium 99	<b>Fm</b> Fermium 100	<b>Md</b> Mendelevium 101	<b>No</b> Nobelium 102	<b>Lr</b> Lawrencium 103		

Key

a	a = relative atomic mass
<b>X</b>	<b>X</b> = atomic symbol
b	b = proton (atomic) number

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