UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY **5070/01**

Paper 1 Multiple Choice **May/June 2007**

1 hour

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

* 1 4 1 0 7 4 2 3 9 3 *

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.

This document consists of **14** printed pages and **2** blank pages.

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1 Which property of a gas affects the rate at which it spreads throughout a laboratory?

A boiling point

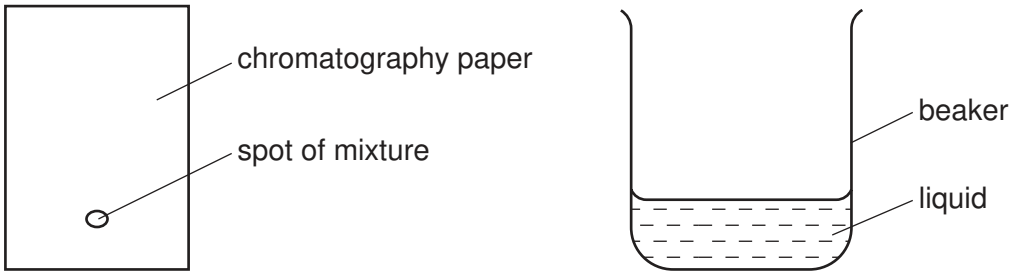
B molecular mass

C reactivity

D solubility in water

2 A mixture of two substances is spotted on to a piece of chromatography paper.

The paper is inserted into a beaker containing a liquid.



For separation of the substances to occur the mixture must

A be placed so that the spot is just below the level of the liquid.

B be soluble in the liquid.

C contain substances of the same R_f values.

D contain substances that are coloured.

3 Which pair of substances are both mixtures?

A air; water

B limewater; water

C sea-water; air

D sea-water; ethanol

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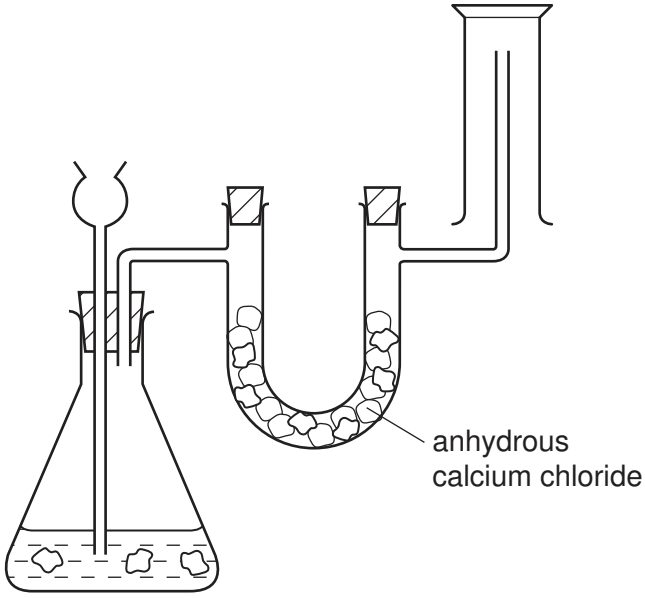
4 The diagram shows a simple laboratory apparatus for the preparation and collection of a dry gas.



What is the gas?

A carbon dioxide

B chlorine

C hydrogen

D hydrogen chloride

5 Gas **X**

- has no effect either on damp red litmus paper or on damp blue litmus paper,
- puts out both a glowing splint and a burning splint.

What is gas **X**?

A ammonia

B carbon dioxide

C chlorine

D nitrogen

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6 What is the structure of the ion $^{90}_{38}Sr^{2+}$?

	protons	neutrons	electrons
A	38	52	36
B	38	52	38
C	38	90	36
D	52	38	36

7 In which substance is each carbon atom covalently bonded to **only three** other atoms?

A carbon dioxide

B diamond

C graphite

D methane

8 In which pair of substances does each have a giant molecular structure?

A diamond, iodine

B diamond, silica (sand)

C iodine, methane

D methane, silica (sand)

9 How does a magnesium atom form a bond with an oxygen atom?

A by giving one pair of electrons to the oxygen atom

B by sharing one pair of electrons, both electrons provided by the magnesium atom

C by sharing two pairs of electrons, both pairs provided by the oxygen atom

D by sharing two pairs of electrons, each atom donating one pair of electrons

10 Metals have positive ions in a 'sea of electrons'.

Which metal atom provides most electrons for the sea?

A aluminium

B calcium

C magnesium

D sodium

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11 The element X forms a gaseous molecule X_2. One volume of X_2 combines with one volume of hydrogen to form two volumes of a gaseous hydride.

What is the formula for the hydride of X?

A HX **B** HX_2 **C** H_2X **D** H_2X_2

12 Which substance has the highest percentage by mass of nitrogen?

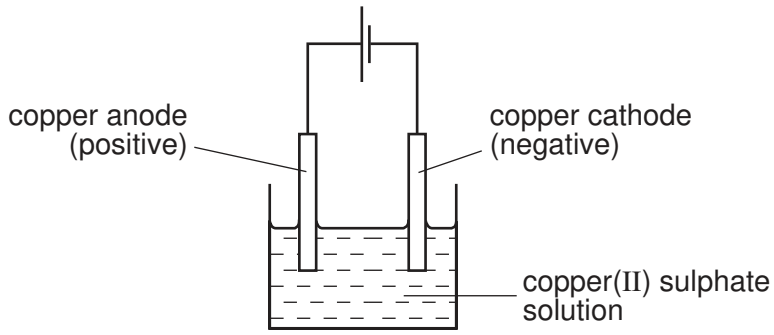
A NH_4NO_3 $M_r = 80$

B $(NH_4)_2SO_4$ $M_r = 132$

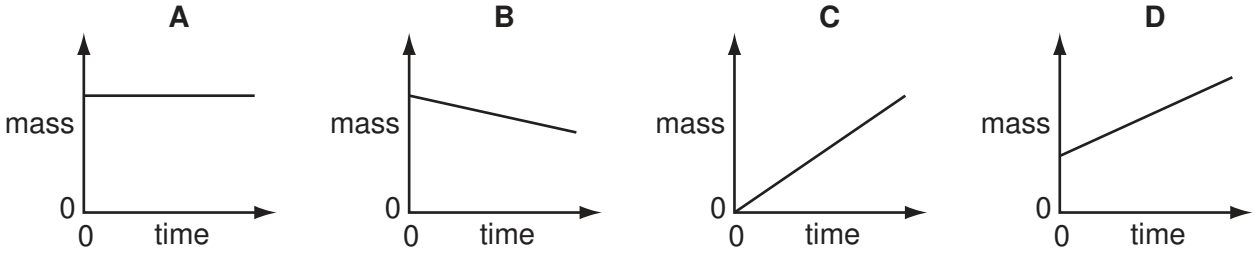
C $CO(NH_2)_2$ $M_r = 60$

D $(NH_4)_3PO_4$ $M_r = 149$

13 The diagram shows the electrolysis of aqueous copper(II) sulphate using copper electrodes.



Which graph shows how the mass of the cathode changes during electrolysis?



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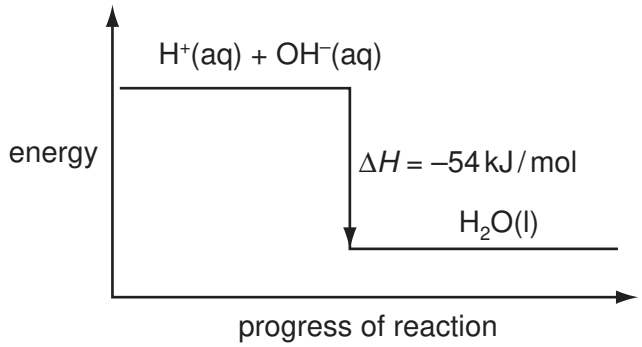
14 The energy diagram for the reaction between sodium hydroxide and hydrochloric acid is shown.



What can be deduced from the diagram?

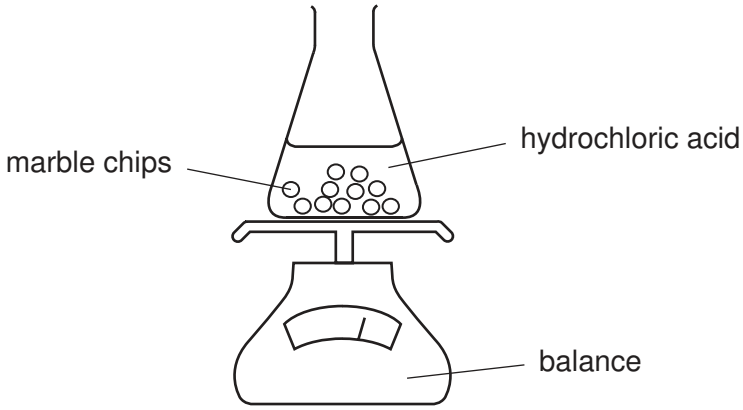
A Heat is needed to start the reaction.

B The products contain less energy than the reactants.

C The reaction is rapid.

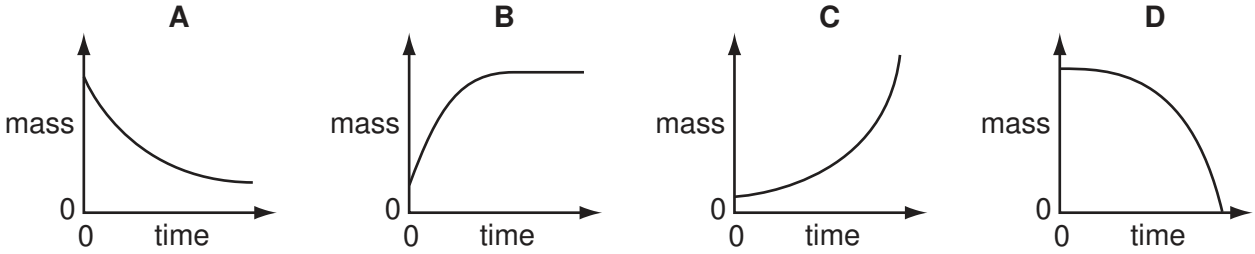
D The OH^- ions have more energy than the H^+ ions.

15 A student adds marble chips to hydrochloric acid.



The mass of flask and contents is measured at regular time intervals.

Which graph shows the result?



16 In which change is the nitrogen reduced?

A NH_3 to NO **B** NH_3 to NO_3^- **C** N_2 to NH_3 **D** N^{3-} to N_2

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17 The equation shows the reaction for the formation of sulphur trioxide.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) \qquad \Delta H = -197\,kJ$$

Which change in reaction conditions would produce more sulphur trioxide?

A adding more catalyst

B decreasing the pressure

C increasing the temperature

D removing some sulphur trioxide

18 Which salt can be prepared by an acid-alkali titration method?

A ammonium sulphate

B copper(II) sulphate

C iron(II) sulphate

D zinc sulphate

19 The table shows properties of four chlorides.

Which is magnesium chloride?

	colour	solubility in water	method of preparation
A	green	soluble	metal and acid
B	white	insoluble	precipitation
C	white	soluble	metal and acid
D	green	insoluble	precipitation

20 Why is ethanoic acid described as a weak acid?

A It is only slightly ionised in water.

B It is a poor conductor of electricity.

C It is an organic acid.

D It reacts only with very reactive metals.

21 Which pair of substances produce a precipitate when their aqueous solutions are mixed?

A barium nitrate, silver nitrate

B sodium chloride, barium nitrate

C sodium nitrate, barium chloride

D sodium sulphate, barium chloride

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22 Ammonia may be obtained from ammonium chloride by heating with

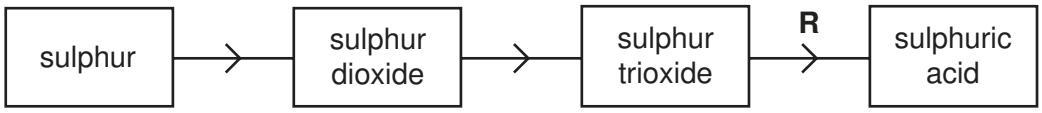
A aqueous calcium chloride.

B aqueous sodium hydroxide.

C dilute hydrochloric acid.

D water.

23 The diagram represents the manufacture of sulphuric acid by the Contact process.



What is used in step **R**?

A vanadium(V) oxide

B water only

C water followed by concentrated sulphuric acid

D concentrated sulphuric acid followed by water

24 Rubidium, Rb, is an element in Group I of the Periodic Table.

Which statement about rubidium is correct?

A It reacts slowly with water.

B It forms an insoluble hydroxide.

C It is liberated at the cathode during the electrolysis of an aqueous solution of its chloride.

D It forms a sulphate, Rb_2SO_4.

25 The element sulphur, S, is in Group VI of the Periodic Table.

Which formula is **incorrect**?

A S^{2-} **B** S_2O_3 **C** SO_4^{2-} **D** SO_3

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26 The table shows some of the properties of four elements.

Which element is **most** likely to be a transition metal?

	melting point °C	density g/cm^3	electrical conductivity
A	3550	3.5	poor
B	1860	7.2	good
C	660	2.7	good
D	232	7.3	good

27 Which equation represents the reaction of calcium with cold water?

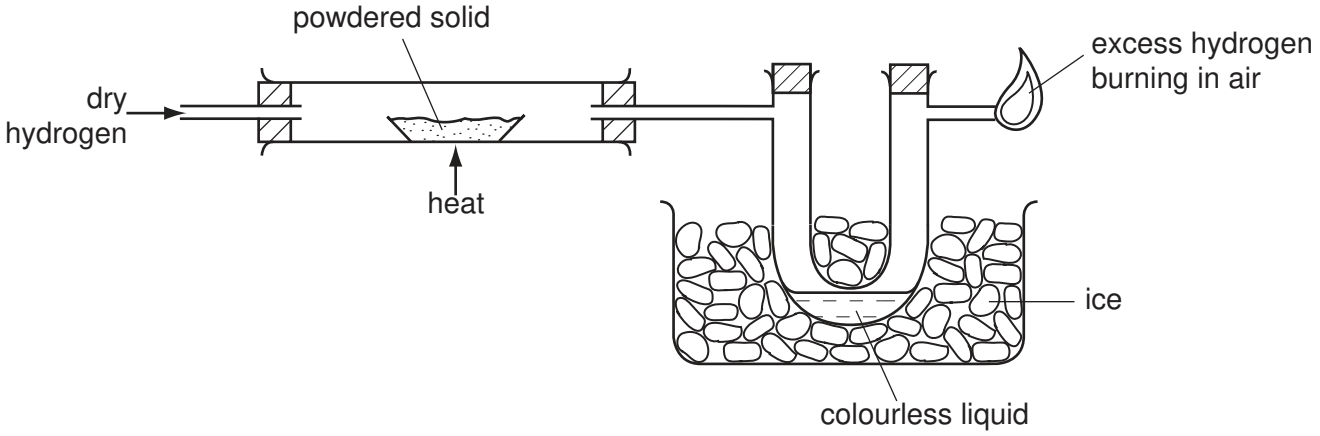
A $Ca + H_2O \rightarrow CaO + H_2$

B $2Ca + 2H_2O \rightarrow 2CaOH + H_2$

C $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

D $Ca + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$

28 Dry hydrogen gas is passed over a powdered solid and then through a cooled U-tube before the excess of hydrogen is burned in air.



A colourless liquid collects in the U-tube.

What could the powdered solid be?

A calcium oxide

B copper(II) oxide

C magnesium

D zinc oxide

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29 A coil of clean copper wire is suspended in aqueous silver nitrate. Crystals of silver are deposited on the copper wire.

Which statement is **not** correct?

A The copper is oxidised.

B The total mass of the crystals of silver increases gradually.

C The total number of positive ions in the solution is unchanged.

D The solution turns blue.

30 Zinc and aluminium both react with dilute hydrochloric acid.

Why does zinc react more quickly than aluminium?

A Aluminium is lower than hydrogen in the reactivity series.

B Aluminium has an oxide coating.

C Zinc is an amphoteric element.

D Zinc is a transition metal.

31 Which metal is used in the sacrificial protection of iron pipes?

A copper

B lead

C magnesium

D sodium

32 Some metals can be obtained by the reduction of their oxides with hydrogen.

Which line of the table is correct?

	aluminium	copper	silver	sodium
A	✓	✓	✗	✗
B	✗	✓	✓	✗
C	✗	✗	✓	✓
D	✓	✗	✓	✗

key

✓ = can be obtained

✗ = cannot be obtained

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33 The table shows pollutants which cause eutrophication, sources of these pollutants and a problem that eutrophication causes.

Which entry in the table is correct?

	pollutant	source	problem
A	nitrates	detergents	oxygen depletion
B	nitrates	fertilisers	excess oxygen
C	phosphates	detergents	oxygen depletion
D	phosphates	fertilisers	excess oxygen

34 Which gas burns in air to form a single product?

A ammonia

B carbon monoxide

C hydrogen chloride

D methane

35 Which pair of statements about the combustion of a carbohydrate and its formation by photosynthesis is **not** correct?

	combustion	photosynthesis
A	reaction exothermic	reaction endothermic
B	oxygen used up	oxygen set free
C	no catalyst needed	catalyst needed
D	chemical energy converted to heat energy	chemical energy converted to light energy

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[Turn over

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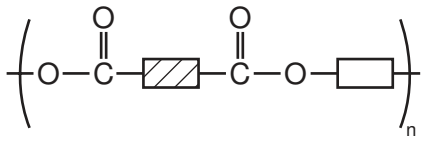
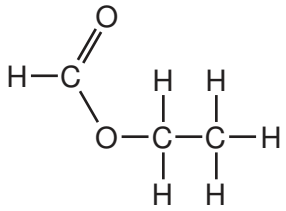
36 Which of the following has **not** been prepared by reacting a carboxylic acid with an alcohol?

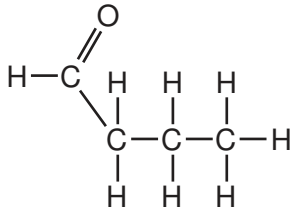
A



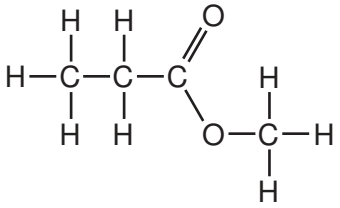
B



C



D



37 Which compound is obtained by the oxidation of ethanol, C_2H_5OH?

A HCO_2CH_3

B $C_2H_5CO_2H$

C CH_3OH

D CH_3CO_2H

38 Which statement applies to all three of the compounds ethane, ethene and ethanol?

A One molecule of each compound contains the same number of carbon atoms.

B One mole of each compound contains the same number of hydrogen atoms.

C They all occur in crude oil.

D They are all liquids at room temperature.

39 What is the empirical formula of ethanoic acid?

A CH_2O **B** CH_4O **C** C_2H_3O **D** $C_2H_4O_2$

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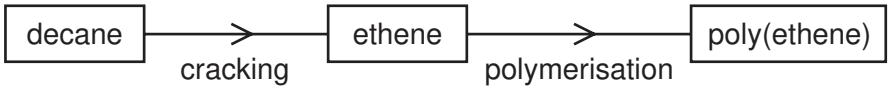
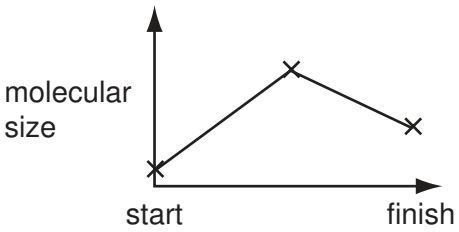
40 Poly(ethene) can be manufactured by the process below.

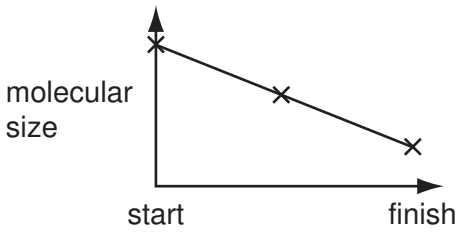


Which diagram shows the change in molecular size during this process?

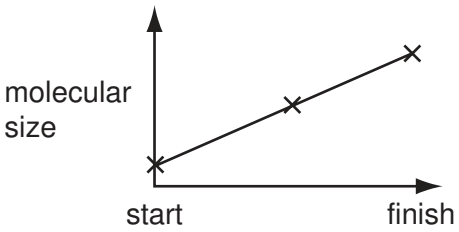
A



B



C



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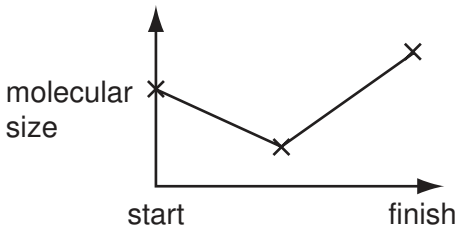

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II									III	IV	V	VI	VII	0		
															4 He Helium 2		
						1 H Hydrogen 1											
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	Tc Technetium 43	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 †															

*58-71 Lanthanoid series	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
†90-103 Actinoid series	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

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.).

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