

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.

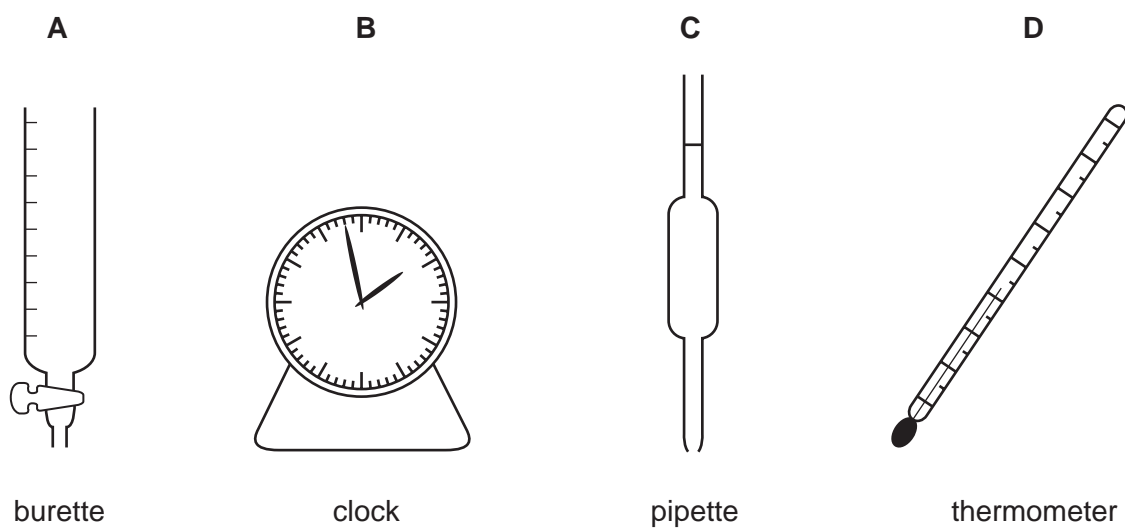
You may use a calculator.

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 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 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

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?

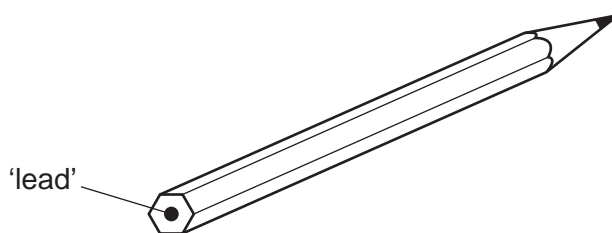
	${}^9\text{F}$	${}^{10}\text{Ne}$
A	7	8
B	7	10
C	9	8
D	9	10

- 6 The electronic configuration of an ion is 2.8.8.

What could this ion be?

	S^{2-}	Ca^{2+}
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 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.

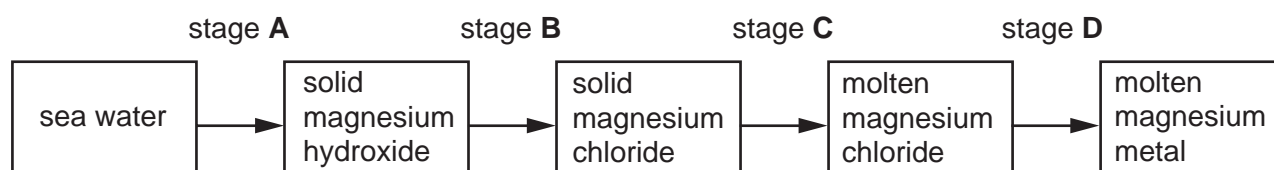
Why is this?

- 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
A	ammonia	NH_4
B	carbon monoxide	CO_2
C	iron(III) oxide	Fe_3O_2
D	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.

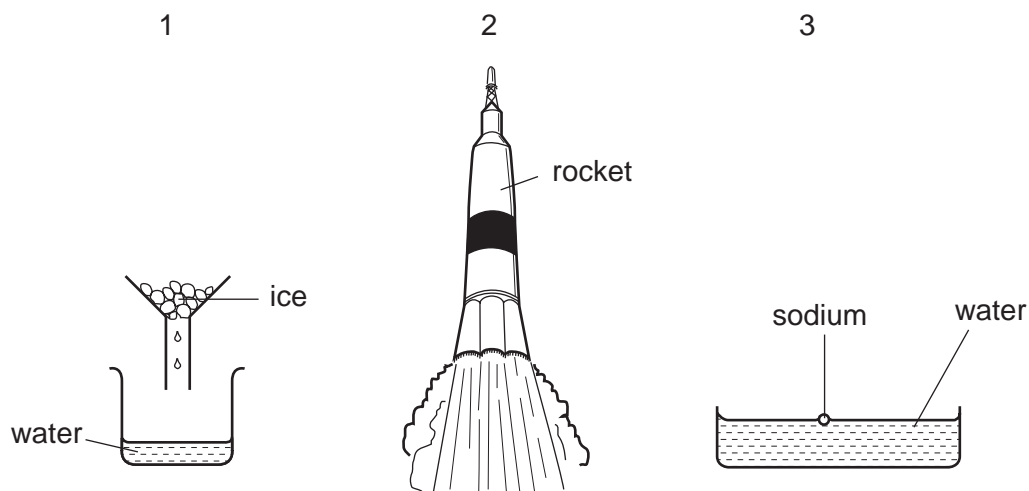
Which element is produced at the negative electrode (cathode)?

- 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?



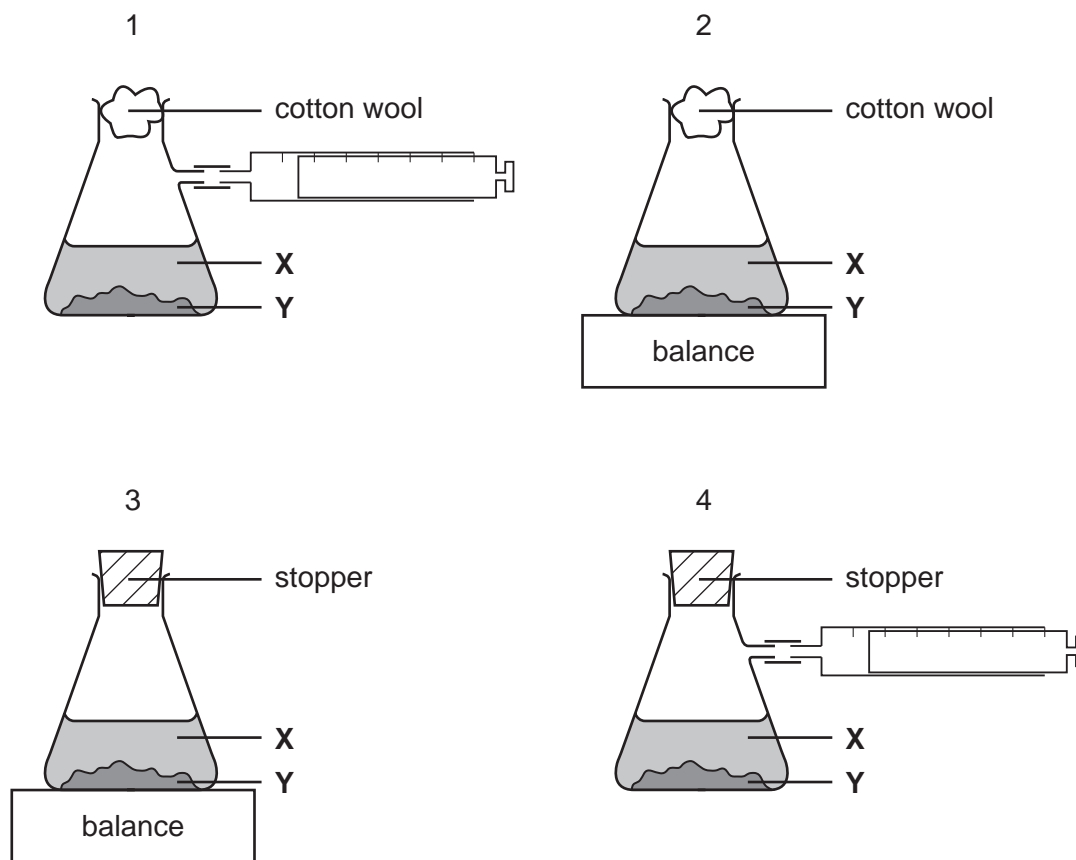
- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

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

	hydrogen	uranium
A	✓	✓
B	✓	x
C	x	✓
D	x	x

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

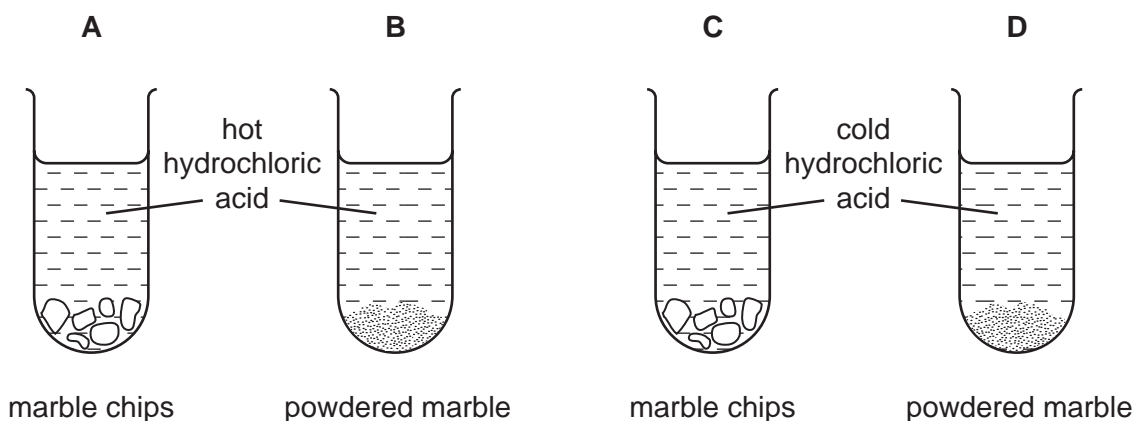
Which **two** diagrams show suitable methods for investigating the speed of the reaction?



- 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 cm³ 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
A	red-brown	red-brown
B	red-brown	colourless
C	yellow-green	yellow-green
D	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.

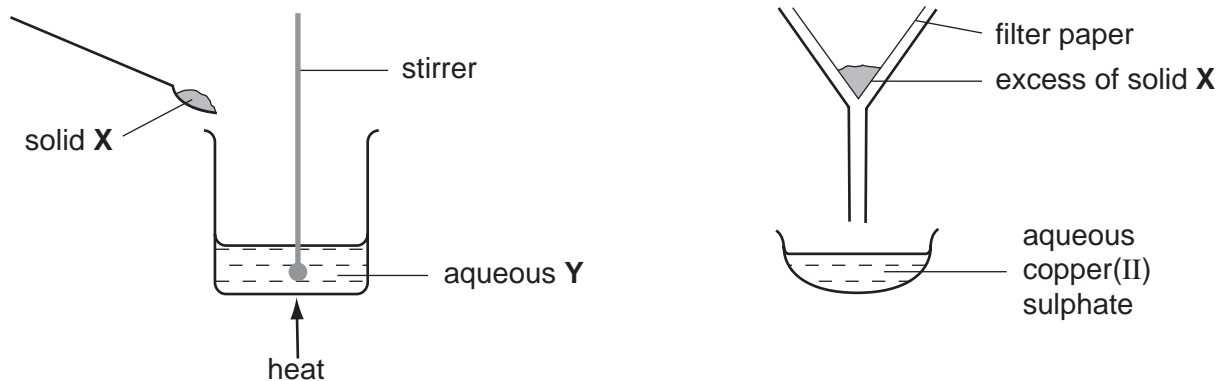
20 Hydrochloric acid is used to clean a metal surface by removing the oxide layer on the metal.

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

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

	X	Y
A	high	acidic
B	high	basic
C	low	acidic
D	low	basic

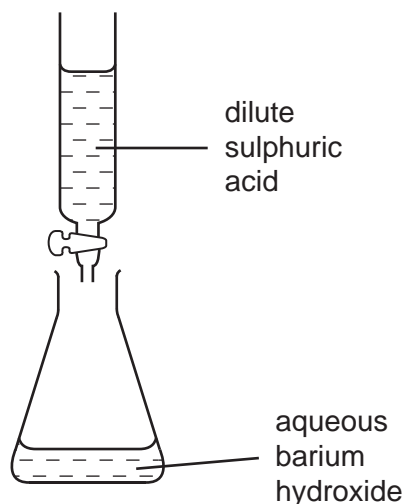
21 The apparatus shown can be used to prepare aqueous copper(II) sulphate.



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

	substance X	substance Y
A	copper	iron(II) sulphate
B	copper(II) chloride	sulphuric acid
C	copper(II) oxide	sulphuric acid
D	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
A	✓	✓
B	✓	x
C	x	✓
D	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
A	catalytic activity	low	high
B	density	high	low
C	electrical conductivity	low	high
D	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
A	liquid	reacts quickly
B	liquid	reacts slowly
C	solid	reacts quickly
D	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 Na₂O can be reduced by heating with carbon?

- A CaO only
- B CuO only
- C Na₂O only
- D CaO, CuO and Na₂O

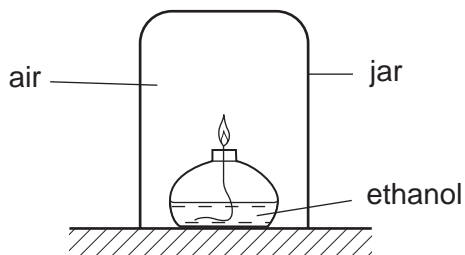
30 Three stages in making steel from iron ore are listed.

- 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
A	✓	✓	✓
B	x	✓	✓
C	✓	✓	x
D	✓	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	✓	✓

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DATA SHEET
The Periodic Table of the Elements

		Group																																																																																																								
I	II	III	IV	V	VI	VII	0					0																																																																																														
7 Li Lithium 3	9 Be Beryllium 4	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	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Ca Calcium 20	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	55 Cs Caesium 55	56 Ba Barium 56	57 La Lanthanum 57	58 Ce Cerium 58	59 Pr Praseodymium 59	60 Nd Neodymium 60	61 Pm Promethium 61	62 Sm Samarium 62	63 Eu Europium 63	64 Gd Gadolinium 64	65 Tb Terbium 65	66 Dy Dysprosium 66	67 Ho Holmium 67	68 Er Erbium 68	69 Tm Thulium 69	70 Yb Ytterbium 70	71 Lu Lutetium 71	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 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

* 58-71 Lanthanoid series
90-103 Actinoid series

Key

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).