Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/11**

Paper 1 Multiple Choice **May/June 2015**

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, 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.
DO **NOT** WRITE IN ANY BARCODES.

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.
Electronic calculators may be used.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level1/Level 2 Certificate.

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

1 The changes that occur when a substance changes state are shown below.

$$\text{solid} \underset{Z}{\overset{W}{\rightleftharpoons}} \text{liquid} \underset{Y}{\overset{X}{\rightleftharpoons}} \text{gas}$$

Which process, W, X, Y or Z, is occurring in the following four situations?

1 Butter melts on a warm day.

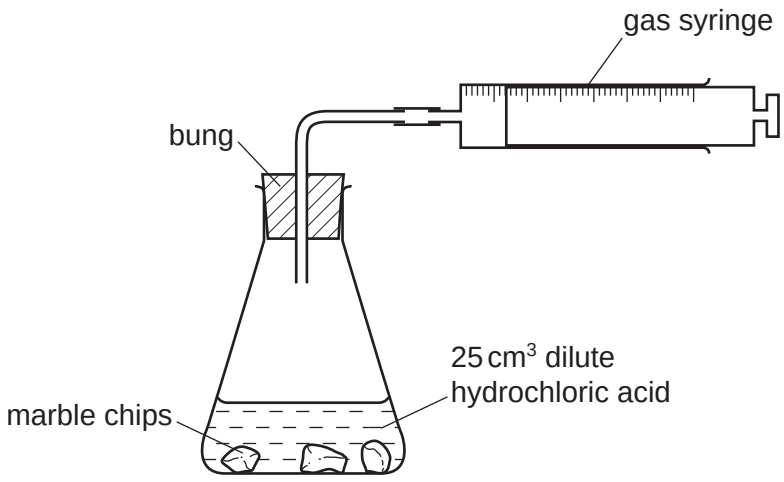
2 Water condenses on a cold surface.

3 The volume of liquid ethanol in an open beaker reduces.

4 Ice forms inside a freezer.

	1	2	3	4
A	W	X	Y	Z
B	W	Y	X	Z
C	X	Y	Z	W
D	X	Z	Y	W

2 A student uses the apparatus shown in the diagram below to measure the volume of carbon dioxide gas made when different masses of marble chips are added to 25 cm^3 of dilute hydrochloric acid.



Which other items of apparatus are needed?

A funnel and balance

B funnel and stopwatch

C measuring cylinder and balance

D measuring cylinder and stopwatch

3 Atoms contain electrons, neutrons and protons.

What is the definition of nucleon number?

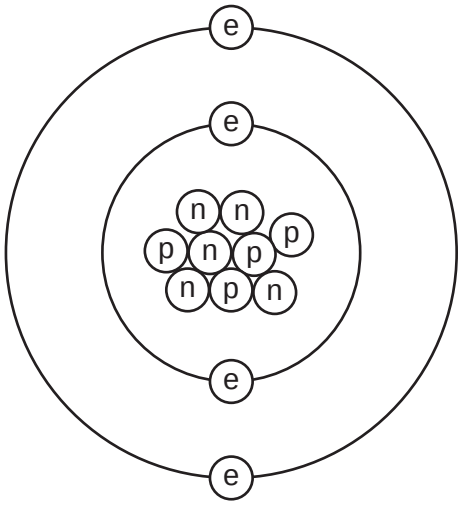
A the number of neutrons in the nucleus of an atom

B the number of protons in the nucleus of an atom

C the total number of neutrons and protons in the nucleus of an atom

D the total number of particles in an atom

4 The diagram shows the atomic structure of an element X.



What is X?

A aluminium

B beryllium

C boron

D fluorine

5 Which statements comparing the properties of electrons, neutrons and protons are correct?

	neutrons and protons are both heavier than electrons	only electrons and neutrons are charged
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

6 Rescuers are drilling through fallen rock in order to rescue some men trapped in a cave. The drill needs lubricating from time to time.

The following statements were made about the materials used for the drill tip and the lubricant and the reasons for their use.

1 Diamond was used for the drill tip as it does not conduct electricity.

2 Diamond was used for the drill tip as it is very hard.

3 Graphite was used as the lubricant as it conducts electricity.

4 Graphite was used as the lubricant as it is soft and flaky.

Which statements are correct?

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

7 In which compounds are pairs of electrons shared between atoms?

1 methane

2 lead bromide

3 sodium chloride

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

8 What is the relative formula mass, M_r, of $CaCO_3$?

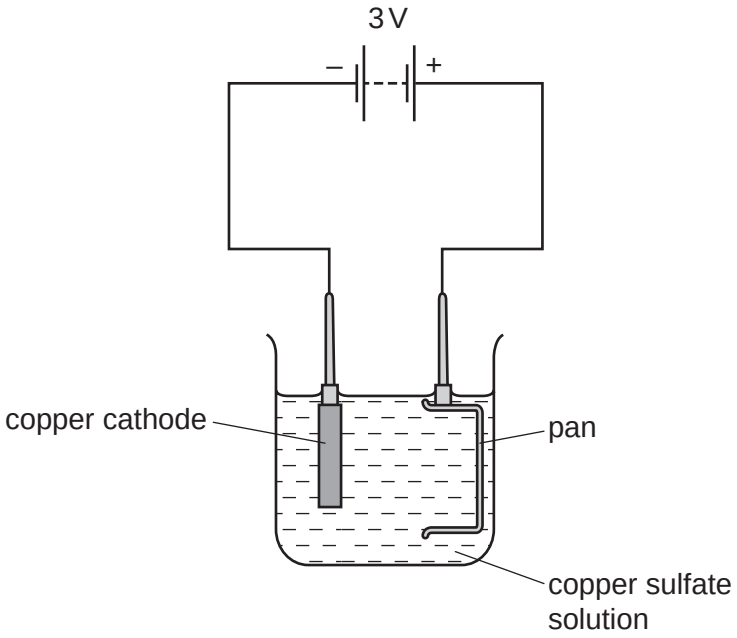
A 50 **B** 68 **C** 100 **D** 204

9 Copper and hydrogen can each be formed by electrolysis.

At which electrodes are these elements formed?

	copper	hydrogen
A	anode	anode
B	anode	cathode
C	cathode	anode
D	cathode	cathode

10 The diagram shows a failed attempt to copper-plate a pan.



Which action will plate the pan with copper?

A cooling the copper sulfate solution in an ice bath

B heating the copper sulfate solution to boiling point

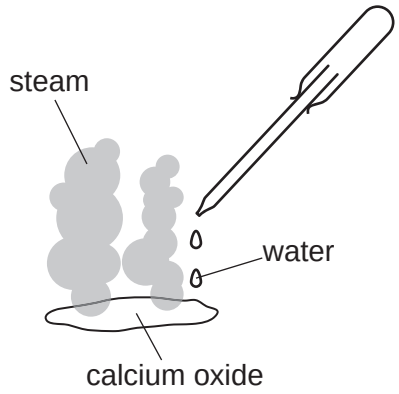
C increasing the voltage from 3 V to 6 V

D making the pan the cathode and the copper the anode

11 The diagrams show four chemical reactions.

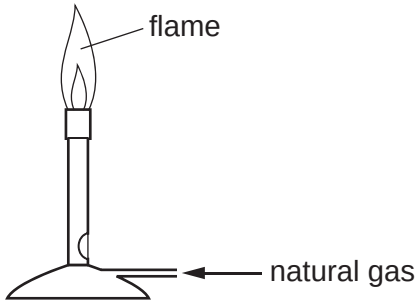
Which reaction is endothermic?

A



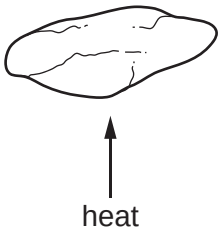
addition of water to calcium oxide

B



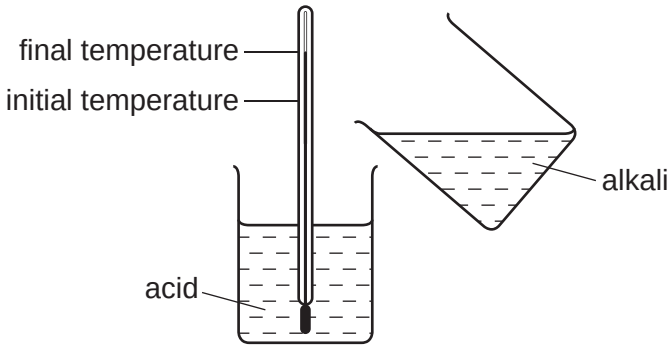
combustion of natural gas

C



thermal decomposition of limestone

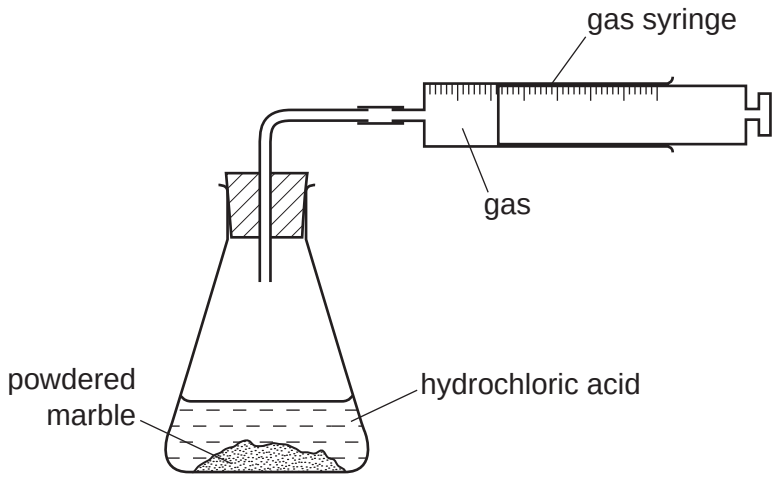
D



reaction of acid with alkali

12 Powdered marble reacts with hydrochloric acid using the apparatus shown.

The gas syringe fills in 36 seconds.



The experiment is repeated using marble chips in place of powdered marble.

How long does it take to fill the gas syringe in this experiment?

A 9 seconds

B 18 seconds

C 36 seconds

D 72 seconds

13 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.

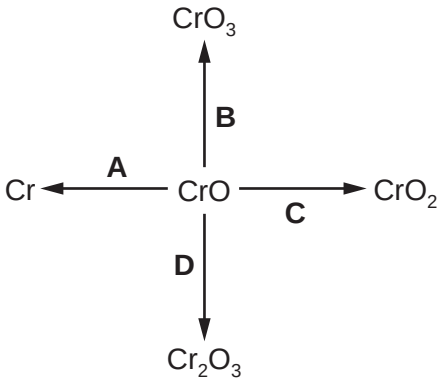
$$CoCl_2.6H_2O \rightleftharpoons CoCl_2 + 6H_2O$$

What happens when water is added to the blue solid?

	colour	temperature
A	changes to pink	decreases
B	changes to pink	increases
C	remains blue	decreases
D	remains blue	increases

[Turn over

14 In which change is chromium(II) oxide, CrO, reduced?



15 The table shows the pH of four aqueous solutions, W, X, Y and Z.

substance	pH
W	7
X	9
Y	2
Z	5

Universal Indicator is added to each solution.

Which row shows the colour of each solution after the indicator is added?

	W	X	Y	Z
A	blue	green	orange	red
B	green	blue	red	orange
C	orange	red	blue	green
D	red	orange	green	blue

16 Hydrochloric acid is used to clean metals.

The acid reacts with the oxide layer on the surface of the metal, forming a salt and water.

Which word describes the metal oxide?

A alloy

B base

C element

D indicator

17 Four steps to prepare a salt from an excess of a solid base and an acid are listed.

1 crystallisation

2 evaporation

3 filtration

4 neutralisation

In which order are the steps carried out?

A 2 → 3 → 4 → 1

B 3 → 1 → 2 → 4

C 4 → 2 → 1 → 3

D 4 → 3 → 2 → 1

18 Which two compounds give a white precipitate when their aqueous solutions are mixed?

A silver nitrate and sodium chloride

B silver nitrate and sodium iodide

C sodium hydroxide and copper(II) sulfate

D sodium hydroxide and iron(II) chloride

19 Which element is in the same group of the Periodic Table as lithium?

	electrical conductivity	density in g / cm^3
A	high	0.97
B	high	8.93
C	low	0.07
D	low	3.12

20 Which properties of the element titanium, Ti, can be predicted from its position in the Periodic Table?

	can be used as a catalyst	conducts electricity when solid	has low density	forms coloured compounds
A	✓	✓	✓	✗
B	✓	✓	✗	✓
C	✓	✗	✓	✓
D	✗	✓	✓	✓

21 The following statements are about elements in the Periodic Table.

1 Their atoms have a full outer shell of electrons.

2 They form basic oxides.

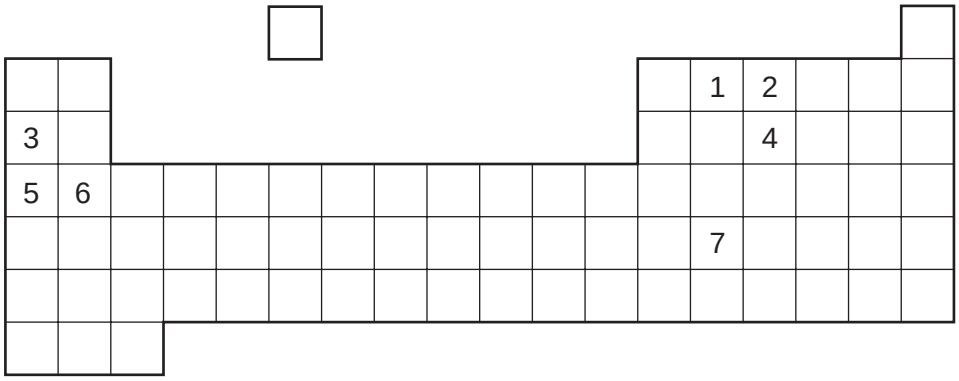
3 They are found in Group 0.

4 They are present in small quantities in the air.

Which statements are correct for the noble gases?

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

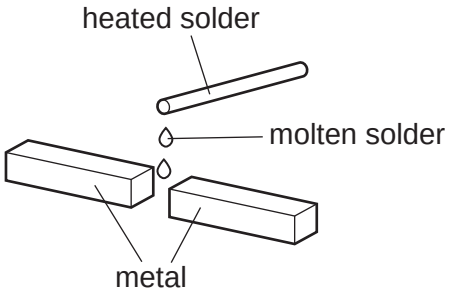
22 In the outline of the Periodic Table below, some elements are shown as numbers.



Which two numbers are **metals** in the same period?

A 1 and 2 **B** 1 and 7 **C** 3 and 5 **D** 5 and 6

23 Solder is an alloy of lead and tin. It is used for joining pieces of metal.



Which statement about solder is correct?

A It can be represented by a chemical formula.

B It contains a mixture of lead and tin.

C It contains lead and tin chemically combined.

D It has a higher melting point than lead or tin.

24 What is a major use of aluminium?

A making brass

B making cutlery

C making electrical wiring

D making food containers

25 Which row describes the conditions used to make steel from the iron produced by a blast furnace?

	calcium oxide (lime)	oxygen	heat
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✓	✗

26 W, X, Y and Z are four metals.

Some properties of these metals are listed below.

1 Only W and Z can be extracted by reduction of their oxides with carbon.

2 Only X will react with cold water.

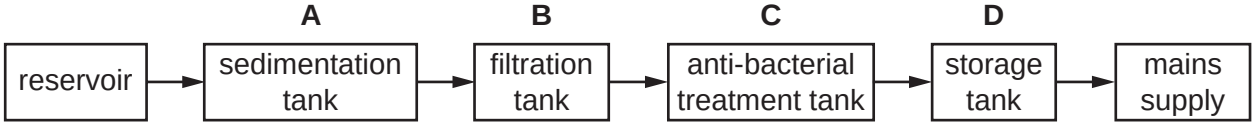
3 Only Z can be found 'native' (not combined with any other element).

What is the correct order of these metals in the reactivity series (most reactive first)?

A X, W, Y, Z **B** X, Y, W, Z **C** Z, W, Y, X **D** Z, Y, W, X

27 The diagram shows stages in producing drinking water.

In which tank is chlorine added to the water?



28 Which gas is **not** found in clean air?

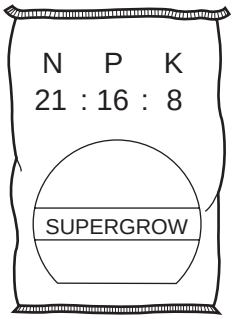
A carbon dioxide

B carbon monoxide

C nitrogen

D oxygen

29 Which combination of chemical compounds could be used to produce the fertiliser shown?



A $(NH_4)_3PO_4$, KCl

B NH_4NO_3, $Ca_3(PO_4)_2$

C NH_4NO_3, $CO(NH_2)_2$

D NH_4NO_3, K_2SO_4, $(NH_4)_2SO_4$

30 The pollutants released into the air from car exhausts and some power stations include oxides of the type XO and YO_2.

What are X and Y?

	X	Y
A	carbon only	nitrogen only
B	carbon only	nitrogen and sulfur only
C	carbon and nitrogen	carbon and nitrogen only
D	carbon and nitrogen	carbon, nitrogen and sulfur

31 Which statement about rusting is **not** correct?

A Only oxygen is needed for rusting.

B Painting can stop iron gates rusting.

C Rust is hydrated iron(III) oxide.

D Water and oxygen are both needed for rusting.

32 Carbon dioxide and methane are 'greenhouse gases' which contribute to global warming.

Which process does **not** increase global warming?

A burning fossil fuels

B decay of organic waste

C farming cattle for beef

D growing crops such as sugar cane

33 These statements are about a gas.

1 It is produced by thermal decomposition of a carbonate.

2 It is produced by the fermentation of glucose.

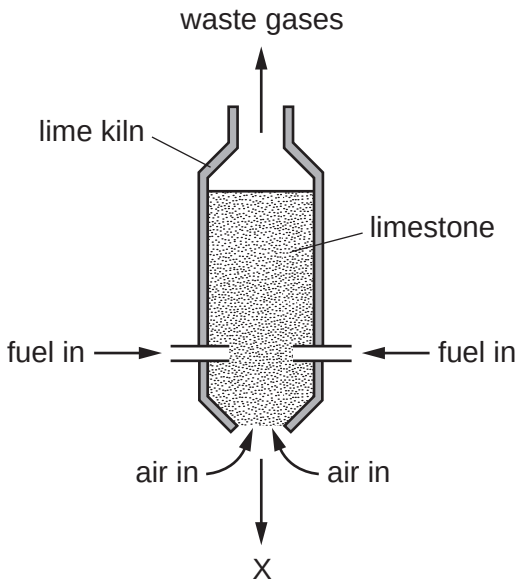
3 It makes up 1% of unpolluted air.

4 It is produced during the production of steel from iron.

Which statements are correct for carbon dioxide?

A 1 and 2 only **B** 1, 2 and 3 **C** 1, 2 and 4 **D** 1, 3 and 4

34 The diagram represents a lime kiln.



What leaves the furnace at X?

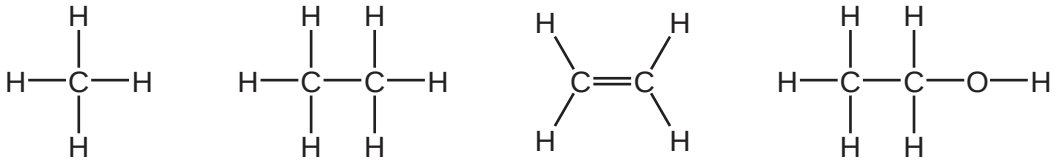
A calcium carbonate

B calcium hydroxide

C calcium oxide

D calcium sulfate

35 The structures of four organic compounds are shown.



Which statement is **not** correct?

A Only one of the compounds is an alcohol.

B Only one of the compounds is an alkane.

C Only one of the compounds is unsaturated.

D Only three of the compounds are hydrocarbons.

36 Which statement about petroleum is **not** correct?

A It can be separated into useful substances by fractional distillation.

B It consists mainly of hydrocarbons.

C It is found underground in many parts of the world.

D Its main use is for making lubricants and polishes.

37 Which statement about alkane molecules is correct?

A They burn in oxygen.

B They contain carbon, hydrogen and oxygen atoms.

C They contain double bonds.

D They contain ionic bonds.

38 Which statements are correct for ethanoic acid?

1 It contains a carbon-oxygen double bond.

2 It contains two carbon atoms.

3 It decolourises bromine water.

4 It contains an –OH group.

A 1 and 2 only

B 1 and 3

C 1, 2 and 4

D 2, 3 and 4

39 A hydrocarbon A is cracked to make B and hydrogen.

Compound C is formed by the addition polymerisation of B.

To which homologous series do A, B and C belong?

	alkene	alkane
A	A	B and C
B	B	A and C
C	C	A and B
D	–	A and C

40 By which of the following methods is ethanol formed?

1 fractional distillation of petroleum

2 fermentation

3 catalytic addition of steam to ethene

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

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 Sulfur 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 †															

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

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