



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE

5130/01

Paper 1 Multiple Choice

October/November 2009

1 hour

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.

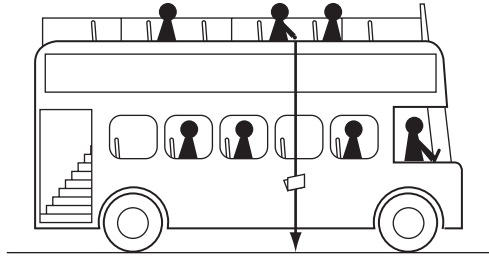
This document consists of **15** printed pages and **1** blank page.



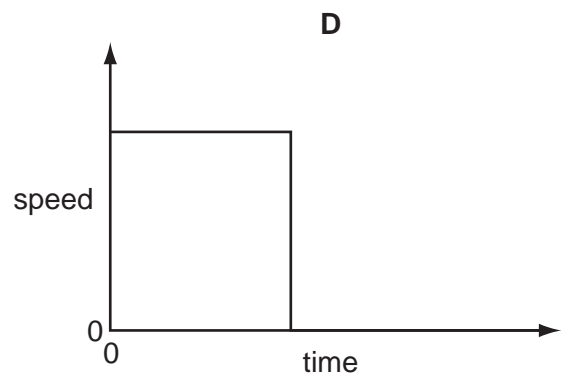
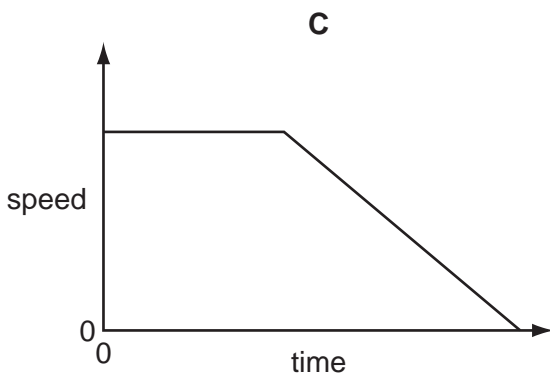
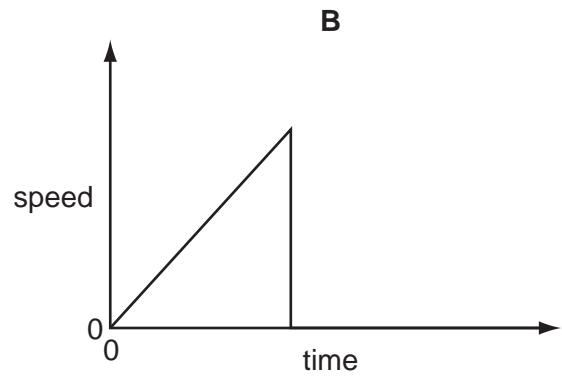
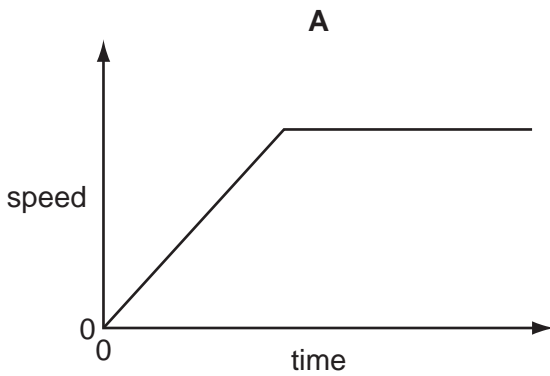
1 Which device should be used to accurately measure the diameter of a thin wire?

- A measuring cylinder
- B metre rule
- C micrometer
- D vernier calipers

2 A tourist drops a wallet from a stationary bus. It falls to the ground and stops.



Which speed-time graph represents the motion of the wallet?

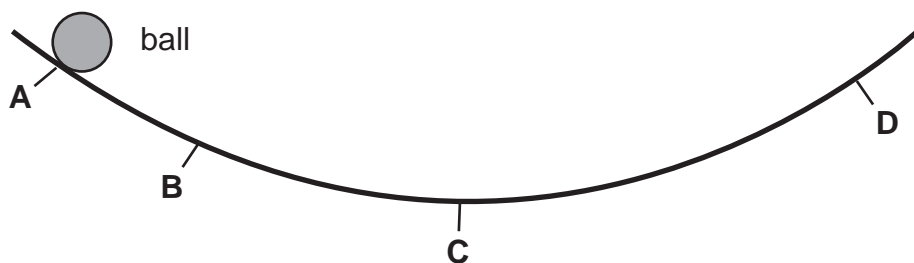


- 3 A uniform bar of length 1.0 m is supported 30 cm from one end. In order to balance the bar, a weight of 10 N is glued on the end.



What is the weight of the bar?

- A** 4.3 N **B** 7.5 N **C** 10 N **D** 15 N
- 4 The diagram shows a curved curtain rail that has a steel ball rolling on it. The ball is released at point **A**.
- At which point does the ball have maximum kinetic energy?



- 5 Glycerine has a melting point of 18°C and a boiling point of 290°C .

In which state is glycerine when its temperature is 12°C ?

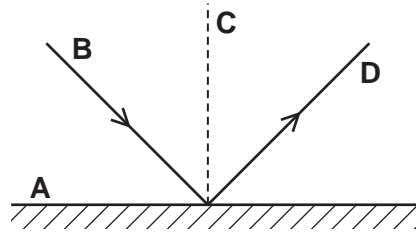
- A** solid
B liquid
C gas
D impossible to tell
- 6 Water waves are produced in a ripple tank using a vibrator of frequency 3 Hz.

Which values of speed and wavelength could the waves have?

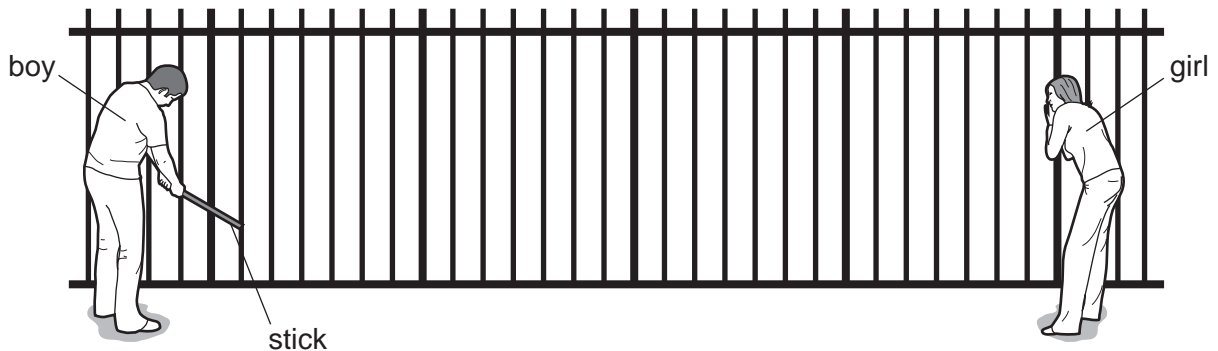
	speed / cm per s	wavelength / cm
A	1	3
B	5	15
C	6	2
D	12	6

7 The diagram shows a ray of light striking a shiny surface.

Which line can be described as normal to a surface?



8 A boy strikes a rigid metal fence with a stick to create a sound along the fence. A girl listens with her ear against the fence. One second after the fence is struck, the girl hears a sound through the air.



How long will it take for the sound to reach the girl through the fence?

- A 0 second
 - B less than 1 second
 - C 1 second
 - D more than 1 second
- 9 How could the unit of potential difference, the volt, also be written?
- A A/s
 - B C/A
 - C C/J
 - D J/C
- 10 The earth wire of an electric appliance should be connected to the
- A fuse.
 - B metal case.
 - C ON/OFF switch.
 - D plastic handle.

11 Electrical energy is transmitted at high alternating voltages.

What is **not** a valid reason for doing this?

- A At high voltage, a.c. is safer than d.c.
- B For a given power, there is a lower current with a higher voltage.
- C There is a smaller power loss at higher voltage and lower current.
- D The transmission lines can be thinner with a lower current.

12 A nucleus of sodium, Na, has 11 protons and 12 neutrons.

Which symbol represents this nucleus?

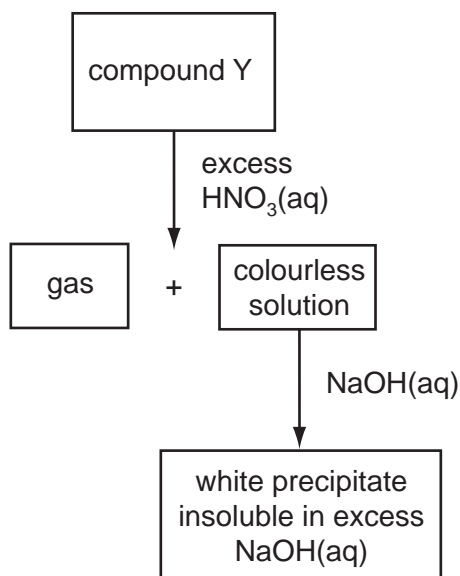
- A ${}_{12}^{11}\text{Na}$
- B ${}_{11}^{12}\text{Na}$
- C ${}_{11}^{23}\text{Na}$
- D ${}_{12}^{23}\text{Na}$

13 A sample contains 12 000 radioactive atoms of a particular nuclide.

After an interval of two half-lives, how many atoms have disintegrated?

- A 0
- B 3000
- C 6000
- D 9000

14 The scheme shows some reactions of a compound Y.



What could the compound Y be?

- A aluminium sulfate
- B calcium carbonate
- C copper(II) carbonate
- D zinc carbonate

15 How can the rate of evaporation of water from a beaker be decreased?

- A by blowing air over the beaker
- B by cooling the beaker
- C by increasing the surface area of the water
- D by shaking the beaker

16 Two particles X and Y have the structure shown in the table.

particle	number of electrons	number of neutrons	number of protons
X	10	8	8
Y	18	18	17

What are particles X and Y?

- A metal atoms
- B non-metal atoms
- C negative ions
- D positive ions

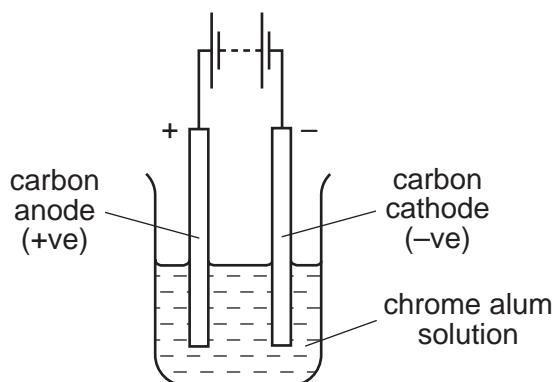
17 The reaction between hydrochloric acid and calcium carbonate is shown.



Which volume of 1.0 mol/dm^3 hydrochloric acid is needed to react completely with 1.0 g of calcium carbonate ($M_r = 100$)?

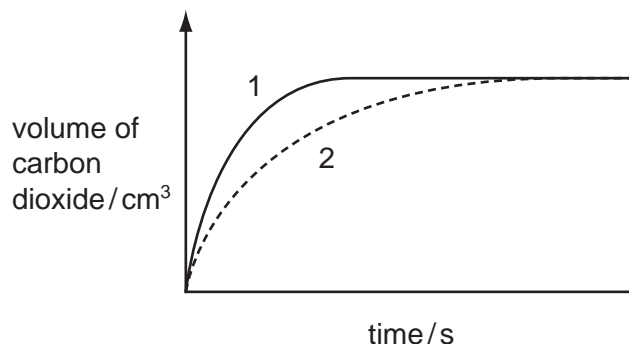
- A 10 cm^3 B 20 cm^3 C 100 cm^3 D 200 cm^3

- 18 A solution of chrome alum, $\text{KCr}(\text{SO}_4)_2$, containing the ions: K^+ , Cr^{3+} , and SO_4^{2-} , was electrolysed as shown.



Which of these ions move towards the cathode?

- A Cr^{3+} and K^+ only
 B Cr^{3+} only
 C K^+ only
 D SO_4^{2-} only
- 19 Curve 1 shows the volume of carbon dioxide given off when 5 g of calcium carbonate lumps react completely with an excess of hydrochloric acid at 40°C .



Which change could produce curve 2?

- A using a lower temperature
 B using a more concentrated solution of the acid
 C using 3 g of calcium carbonate lumps
 D using 5 g of calcium carbonate powder

20 The following equations represent reactions of dilute sulfuric acid.

Which reaction is **not** 'typical' of a dilute acid?

- A $2\text{KOH}(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{K}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
- B $\text{CuO}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CuSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- C $\text{Pb}(\text{NO}_3)_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{HNO}_3(\text{aq})$
- D $\text{ZnCO}_3(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

21 The structure of metals consists of positive ions in a 'sea' of electrons.

The ions can slide over each other.

Which property of metals does this explain?

- A electrical conductivity
- B high density
- C high melting point
- D malleability

22 An element X reacts very slowly with cold water, but reacts vigorously with steam.

Which statement about the reactivity of element X is correct?

- A It is less reactive than copper.
- B It is less reactive than iron.
- C It is more reactive than silver.
- D It is more reactive than sodium.

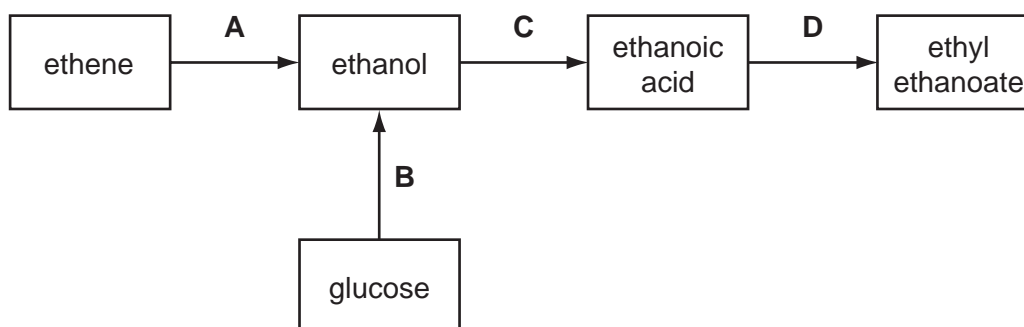
23 Which process uses calcium carbonate?

- A cracking hydrocarbons
- B extracting aluminium
- C extracting iron from iron ore
- D making ammonia

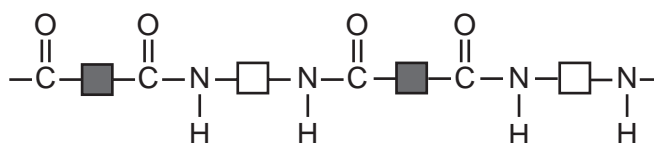
- 24 All the members of a homologous series have the same
- A empirical formula.
 - B general formula.
 - C molecular formula.
 - D physical properties.
- 25 Which property is shown by both hexane and cyclohexene?
- A burn in air to produce carbon dioxide and water
 - B react with bromine dissolved in water
 - C undergo addition reactions
 - D undergo substitution reaction with chlorine

- 26 The diagram shows a series of reactions.

In which reaction is an ester formed?



- 27 From which pair of reagents could the following polyamide be manufactured?



- A HOOC---[]---COOH and $\text{H}_2\text{N---[]---NH}_2$
- B HOOC---[]---NH_2 and HOOC---[]---NH_2
- C HOOC---[]---NH_2 and HOOC---[]---NH_2
- D HOOC---[]---COOH and $\text{H}_2\text{N---[]---NH}_2$

28 Beetroot cells contain a red pigment in their vacuoles.

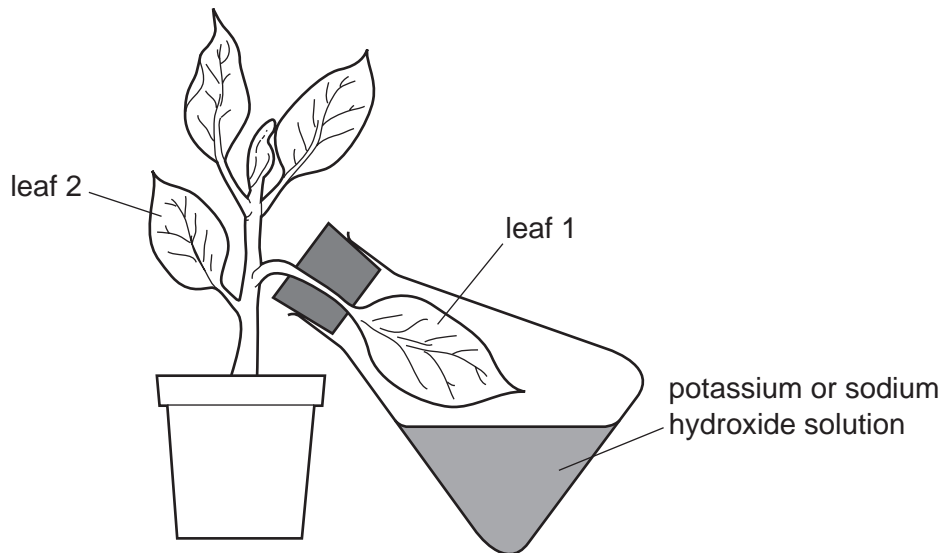
If the cells are placed in water, no pigment escapes into the surrounding liquid.

If the cells are placed in alcohol, red pigment escapes into the surrounding liquid.

Which statement can explain the escape of the pigment into the alcohol?

- A Alcohol makes the cell wall more permeable.
- B Alcohol damages the cell membranes.
- C In alcohol, the cells gain water by osmosis.
- D In alcohol, the cells lose water by osmosis.

29 The apparatus shown is left in the light for five days. Leaf 1 and leaf 2 are then tested for starch.



The experiment is used to show that, during starch formation,

- A carbon dioxide is needed.
- B carbon dioxide is released.
- C oxygen is needed.
- D oxygen is released.

30 The pH in the mouth decreases after eating.

Which statement explains the decrease in pH?

- A Bacteria release acids when breaking down food substances.
- B Enzymes in saliva release acids during digestion.
- C Food substances become alkaline when chewed.
- D Salivary glands release an alkaline solution.

- 31 What is the shortest route that can be taken by the blood travelling from a leg to an arm in the human body?
- A leg → heart → lungs → heart → arm
 B leg → heart → lungs → liver → arm
 C leg → liver → heart → lungs → arm
 D leg → liver → stomach → heart → arm
- 32 What is the equation for aerobic respiration?
- A carbon dioxide + water → glucose + oxygen
 B carbon dioxide + water → alcohol + oxygen
 C oxygen + glucose → carbon dioxide + alcohol
 D oxygen + glucose → water + carbon dioxide
- 33 Which molecules should **not** be included in the solution flowing into an artificial kidney machine?
- A amino acids
 B glucose
 C salt
 D urea
- 34 On a hot day, how would these skin structures respond to help maintain a constant body temperature?

	sweat gland	surface blood vessels
A	decreased sweat production	contract
B	decreased sweat production	get wider
C	increased sweat production	contract
D	increased sweat production	get wider

35 The table shows the results of the analysis of urine samples from four different patients.

Which patient **cannot** produce insulin?

	urea concentration	salt concentration	glucose concentration	protein concentration
A	low	low	zero	zero
B	low	low	zero	high
C	low	low	high	zero
D	high	high	zero	zero

36 Which substances are depressant drugs?

	alcohol	heroin	penicillin
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

key

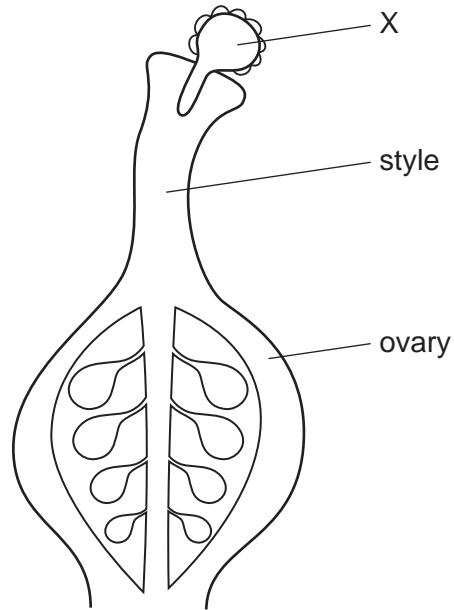
✓ = depressant

x = not a depressant

37 Which process does **not** result in the return of carbon dioxide to the atmosphere?

- A** bacterial respiration
- B** combustion of fossil fuels
- C** mammalian expiration
- D** photosynthesis in green plants

38 The diagram shows part of a flower at one stage during reproduction.



What is structure X?

- A an ovule after fertilisation, but before pollination
- B an ovule after pollination, but before fertilisation
- C a pollen grain after fertilisation, but before pollination
- D a pollen grain after pollination, but before fertilisation

39 The diagram shows human male and female gametes.



Which features describe the male gametes produced during the life of an adult human?

	width in μm	number of gametes	mobility of gametes
A	3	hundreds	can move
B	120	millions	non mobile
C	3	millions	can move
D	120	hundreds	non mobile

40 What is the cause of sickle cell anaemia?

- A bacterial infection
- B changed chromosome number
- C dietary deficiency
- D gene mutation

DATA SHEET
The Periodic Table of the Elements

		Group																																																																						
I	II	III	IV	V	VI	VII	O																																																																	
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 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	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	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86	226 Ra Radium 88	227 Ac Actinium 89	†
												140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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	238 U Uranium 92	238 Pa Protactinium 91	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103																																		

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

a	X
Key	b

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.).

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