



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY

0620/12

Paper 1 Multiple Choice

May/June 2014

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.

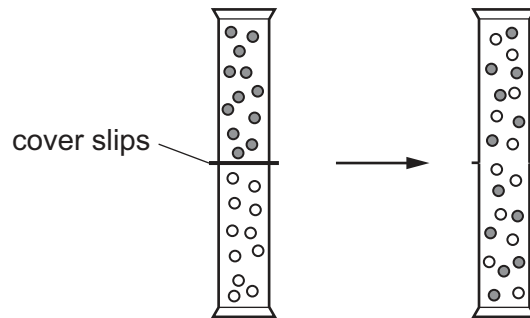
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

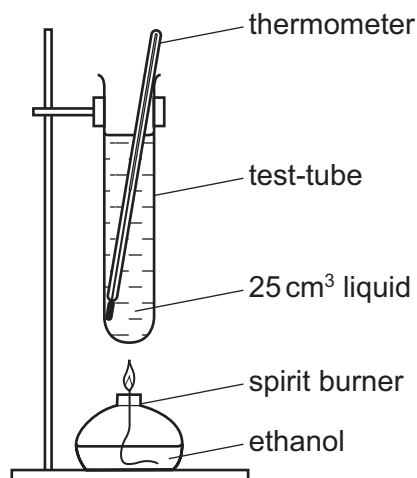
- 1 Two gas jars each contain a different gas. The gas jars are connected and the cover slips are removed.

The diagram shows what happens to the particles of the gases.



Which process has occurred?

- A chemical reaction
 - B condensation
 - C diffusion
 - D evaporation
- 2 A liquid is heated until it boils.



Which result shows that the liquid in the test-tube is pure water?

- A Condensation forms at the top of the test-tube.
- B Steam is produced.
- C The thermometer reads 100 °C.
- D There is nothing left behind in the test-tube.

3 Which two methods can be used to separate a salt from its solution in water?

- 1 crystallisation
- 2 decanting
- 3 distillation
- 4 filtration

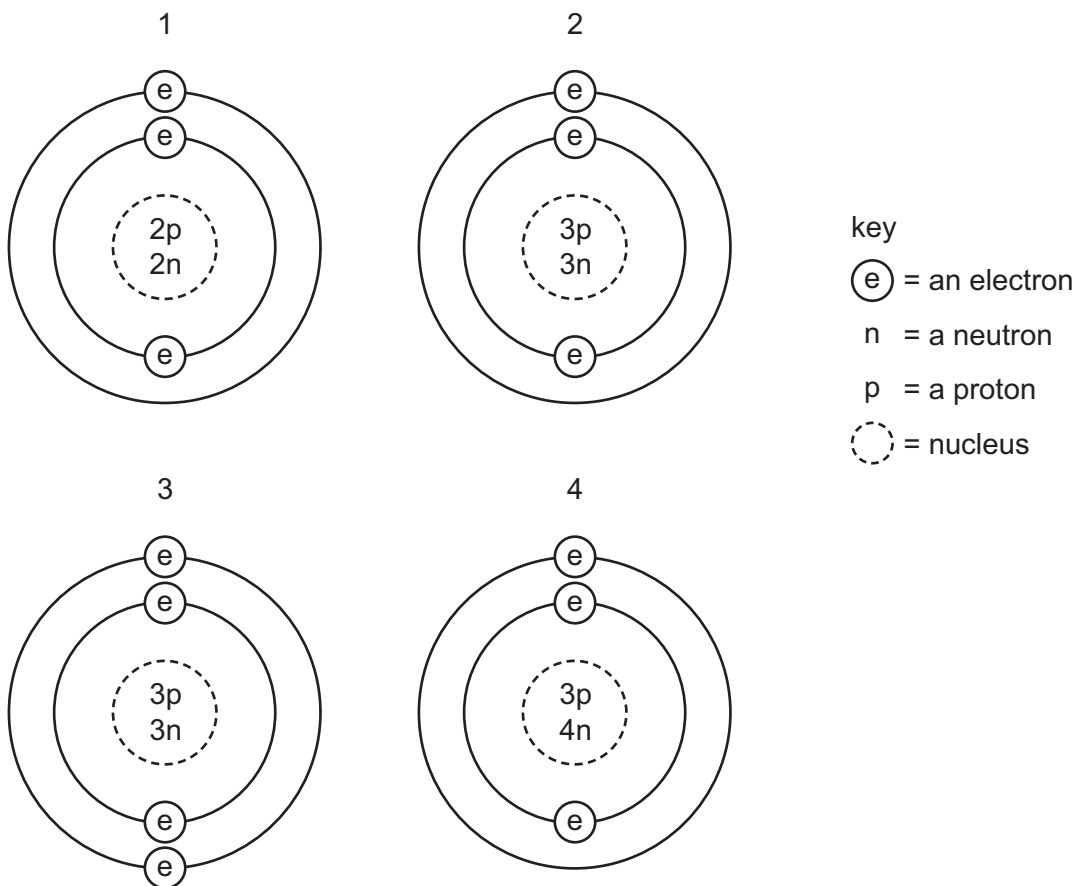
A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 and 4

4 Which statements about a phosphorus atom, $^{31}_{15}\text{P}$, are correct?

- 1 The nucleon number is 16.
- 2 The number of outer electrons is 5.
- 3 The proton number is 15.

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

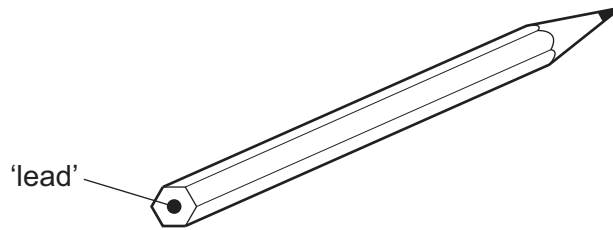
5 The diagrams show four particles.



Which two diagrams show **atoms** that are isotopes of each other?

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

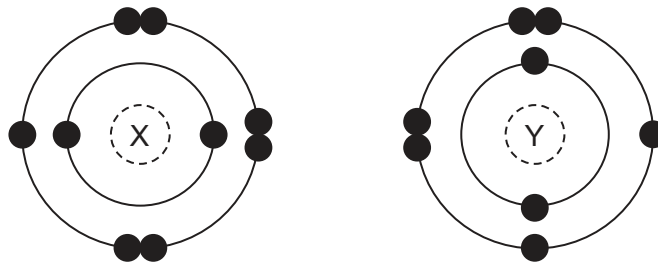
- 6 The 'lead' in a pencil is made of a mixture of graphite and clay.



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

Which statement explains this observation?

- A** Graphite has a high melting point.
B Graphite is a form of carbon.
C Graphite is a lubricant.
D Graphite is a non-metal.
- 7 The electronic structures of two atoms, X and Y, are shown.

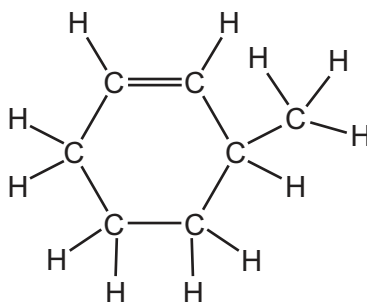


X and Y combine together to form a compound.

What is the type of bonding in the compound and what is the formula of the compound?

	type of bonding	formula
A	covalent	X_2Y
B	covalent	XY_2
C	ionic	XY_2
D	ionic	X_2Y

- 8 The structure of an organic compound, X, is shown.



What is the molecular formula of X?

- A C_6H_9 B C_6H_{12} C C_7H_{12} D C_7H_{14}
- 9 What is the relative molecular mass, M_r , of nitrogen dioxide?
- A 15 B 23 C 30 D 46
- 10 Electrical cables are made from either1....., because it is a very good conductor of electricity, or from.....2....., because it has a low density. Overhead cables have a3..... core in order to give the cable strength.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	aluminium	copper	magnesium
B	copper	aluminium	magnesium
C	copper	aluminium	steel
D	magnesium	copper	steel

- 11 What will be produced at the anode and at the cathode, if molten potassium chloride is electrolysed?

	anode (+)	cathode (-)
A	chlorine	hydrogen
B	chlorine	potassium
C	hydrogen	chlorine
D	potassium	chlorine

12 Solutions of two chemicals are mixed.

A reaction occurs and the temperature change is measured.

Which statement is correct?

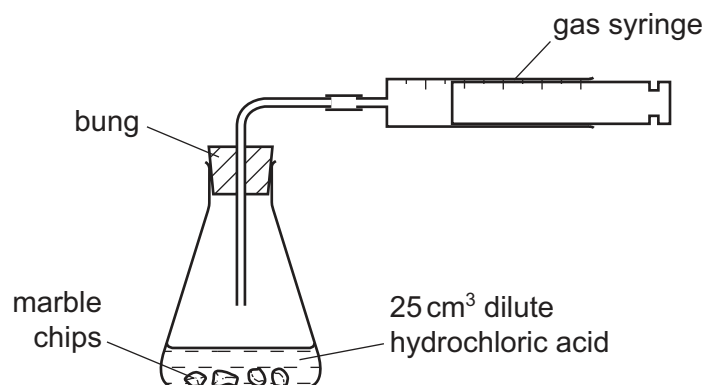
- A If the reaction is endothermic, the temperature decreases and energy is taken in.
- B If the reaction is endothermic, the temperature increases and energy is given out.
- C If the reaction is exothermic, the temperature decreases and energy is given out.
- D If the reaction is exothermic, the temperature increases and energy is taken in.

13 Power stations produce electrical energy from different fuels.

Which fuel causes least pollution to the atmosphere?

- A coal
- B fuel oil
- C natural gas
- D radioactive isotopes

14 A student was investigating the reaction between marble chips and dilute hydrochloric acid.



Which changes would reduce the rate of reaction?

	temperature of acid	concentration of acid	surface area of marble chips
A	decrease	decrease	decrease
B	decrease	decrease	increase
C	increase	decrease	decrease
D	increase	increase	increase

15 Which equation shows an oxidation reaction?

- A $C + O_2 \rightarrow CO_2$
 B $CaCO_3 \rightarrow CaO + CO_2$
 C $CaO + 2HCl \rightarrow CaCl_2 + H_2O$
 D $N_2O_4 \rightarrow 2NO_2$

16 In separate experiments, a catalyst is added to a reaction mixture and the temperature of the mixture is decreased.

What are the effects of these changes on the rate of the reaction?

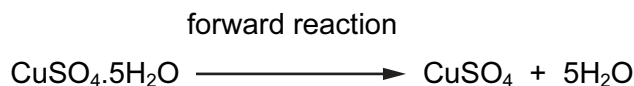
	catalyst added	temperature decreased
A	faster	faster
B	faster	slower
C	slower	faster
D	slower	slower

17 Different plants grow best under different pH conditions.

Which plant grows best in alkaline soil?

	plant	grows best in soil at pH
A	cabbage	6-8
B	potato	4-7
C	strawberry	5-7
D	wheat	6-7

- 18 The equation shows a reaction that is reversed by changing the conditions.



How can the forward reaction be reversed?

	by adding water	by heating
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 19 Element X forms an oxide, XO, that neutralises sulfuric acid.

Which row describes X and XO?

	element X	nature of oxide, XO
A	metal	acidic
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

- 20 Copper carbonate reacts with dilute sulfuric acid to make copper sulfate.



Which row gives the correct order of steps for making copper sulfate crystals?

	step 1	step 2	step 3	step 4
A	add excess acid to the copper carbonate	filter	evaporate filtrate to point of crystallisation	leave to cool
B	add excess acid to the copper carbonate	filter	evaporate to dryness	leave to cool
C	add excess copper carbonate to the acid	evaporate to point of crystallisation	leave to cool	filter
D	add excess copper carbonate to the acid	filter	evaporate filtrate to point of crystallisation	leave to cool

21 Element X is a non-metal.

In which position of the Periodic Table could element X be found?

- A at the bottom of Group I
- B at the top of Group 0
- C at the top of Group I
- D in the transition elements

22 Aqueous sodium hydroxide is added to solid X and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

- A NH_4^+ and Fe^{2+}
- B NH_4^+ and Fe^{3+}
- C OH^- and Fe^{2+}
- D OH^- and Fe^{3+}

23 A student carried out an experiment to find the order of reactivity of five metals. They were tested with cold water, hot water and steam and the results recorded in a table.

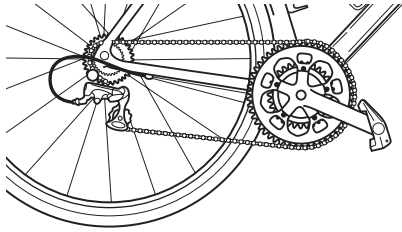
metal	cold water	hot water	steam
V	no reaction	reacts slowly	vigorous reaction
W	no reaction	no reaction	slow reaction
X	reacts slowly	vigorous reaction	not attempted
Y	no reaction	no reaction	no reaction
Z	vigorous reaction	explosive reaction	not attempted

What is the order of reactivity of these metals?

	most reactive		→	least reactive	
A	V	W		X	Z
B	W	X		V	Y
C	Z	X		W	Y
D	Z	X		W	V

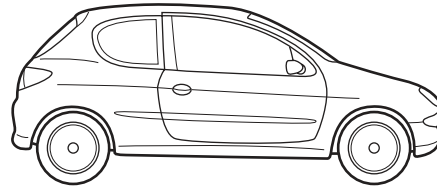
27 Which object is likely to be made from stainless steel?

A



bicycle chain

B



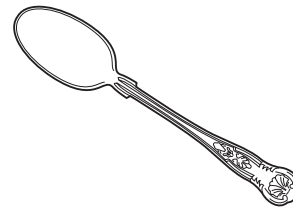
car body

C



can of beans

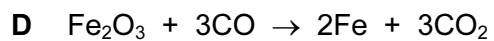
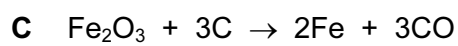
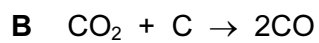
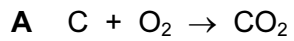
D



teaspoon

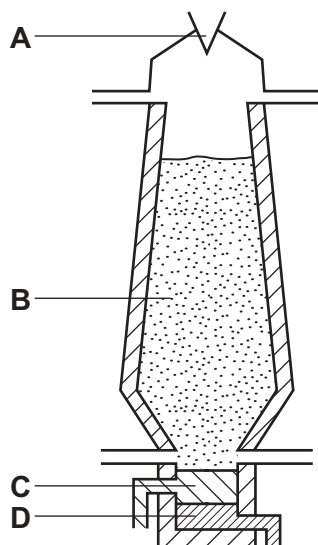
28 Four reactions that take place in the blast furnace to produce iron are shown.

Which reaction is used to keep the furnace hot?

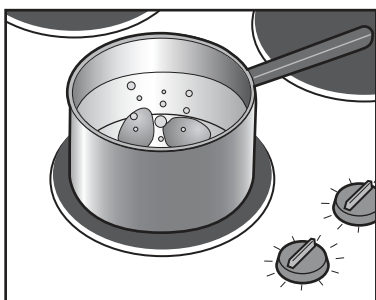


29 The diagram shows a blast furnace.

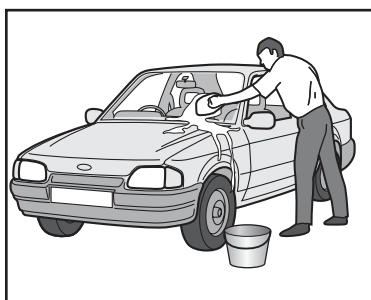
In which part is iron ore changed to iron?



30 The diagram shows some uses of water in the home.



1



2



3

For which uses is it important for the water to have been treated?

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

31 A piece of uncoated iron and three pieces of iron with various coatings were left exposed to the air.

Which piece of iron would rust?

- A** the painted piece
B the tin-coated piece
C the uncoated piece
D the zinc-coated piece

32 Which compound would **not** be an effective fertiliser?

- A ammonium nitrate, NH_4NO_3
- B calcium oxide, CaO
- C calcium phosphate, $\text{Ca}_3(\text{PO}_4)_2$
- D potassium nitrate, KNO_3

33 Sulfur dioxide, SO_2 , nitrogen dioxide, NO_2 , and carbon monoxide, CO , are air pollutants.

Which row correctly shows their major source?

	motor car engines	power stations
A	CO	NO_2 , SO_2
B	NO_2 , CO	SO_2
C	SO_2 , NO_2	CO
D	SO_2	NO_2 , CO

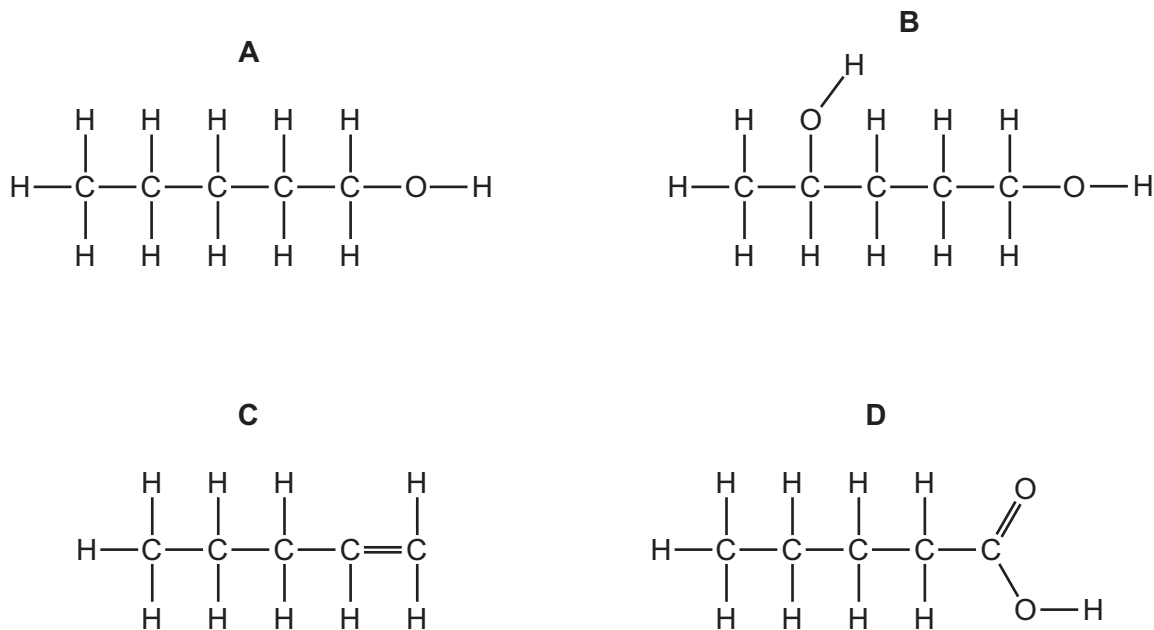
34 Which process does **not** produce carbon dioxide?

- A combustion of methane
- B fermentation of sugar
- C polymerisation of ethene
- D respiration

35 Which pollutant gas is produced by the decomposition of vegetation?

- A carbon monoxide
- B methane
- C nitrogen oxide
- D sulfur dioxide

36 Which diagram shows the structure of pentanoic acid?



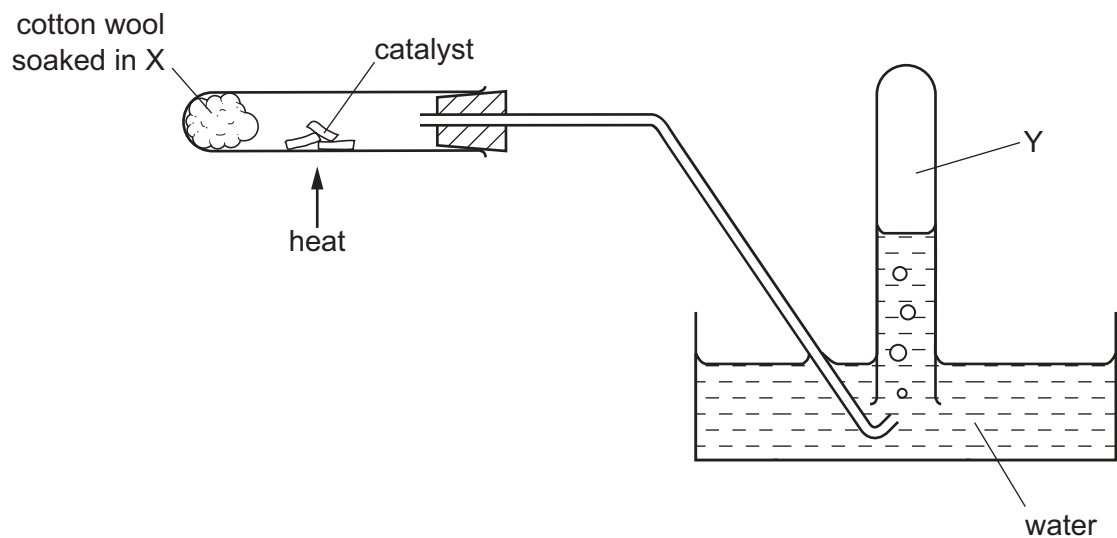
37 The table shows the composition of four different types of petroleum (crude oil).

fraction	Arabian Heavy /%	Arabian Light /%	Iranian Heavy /%	North Sea /%
gasoline	18	21	21	23
kerosene	11.5	13	13	15
diesel oil	18	20	20	24
fuel oil	52.5	46	46	38

Which type of petroleum is best for the motor vehicle industry?

- A** Arabian Heavy
- B** Arabian Light
- C** Iranian Heavy
- D** North Sea

38 The diagram shows the cracking of substance X.



Which type of organic compound is found in Y, which is **not** present in X?

- A** acid
- B** alcohol
- C** alkane
- D** alkene
- 39 In which reaction could one of the products belong to the same homologous series as the organic reactant?
- A** addition of steam to ethene
- B** combustion of an alkane
- C** cracking of an alkane
- D** polymerisation of ethene
- 40 Ethanol is produced from either ethene or sugar.

Which type of chemical reaction is used in each case?

	ethene → ethanol	sugar → ethanol
A	addition	fermentation
B	addition	fractional distillation
C	distillation	fermentation
D	distillation	fractional distillation

DATA SHEET
The Periodic Table of the Elements

		Group															
I	II	III	IV	V	VI	VII	0										
		1 H Hydrogen 1											2 He Helium 2				
7 Li Lithium 3	9 Be Beryllium 4											10 Ne Neon 10					
11 Na Sodium 11	12 Mg Magnesium 12	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18										
19 K Potassium 19	20 Ca Calcium 20	21 Sc Scandium 21	22 Ti Titanium 22	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 Zr Zirconium 40	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	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															

	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	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

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

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

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

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