

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY

0620/01

Paper 1 Multiple Choice

October/November 2006

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.

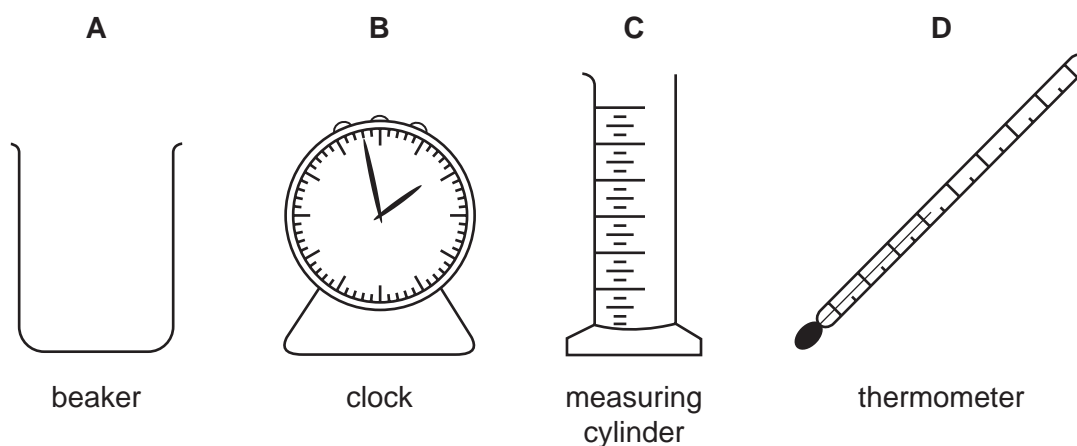
You may use a calculator.

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



- 1 In which change of state do the particles become more widely separated?
- A gas to liquid
 - B gas to solid
 - C liquid to gas
 - D liquid to solid
- 2 A student mixes 25 cm³ samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide. Each time, the student measures the change in temperature.

Which piece of apparatus is **not** needed?



- 3 Which piece of apparatus should be used for the **accurate** measurement of 30.0 cm³ of a liquid?
- A a beaker
 - B a burette
 - C a conical flask
 - D a measuring cylinder
- 4 Which number is different for isotopes of the same element?
- A number of electrons
 - B number of full shells
 - C number of nucleons
 - D number of protons

3

- 5 The table shows the nucleon numbers and proton numbers of some atoms.

nucleon number	35	37	40	39	40
proton number	17	17	18	19	19

How many are atoms of non-metallic elements?

- A 1 B 2 C 3 D 4
- 6 The table shows the electronic structures of four atoms.

atom	electronic structure
W	2,1
X	2,7
Y	2,8,4
Z	2,8,8

Which two atoms combine to form an ionic compound?

- A W and X B W and Y C X and Y D X and Z
- 7 Element X forms an acidic, covalent oxide.

Which row in the table shows how many electrons there could be in the outer shell of an atom of X?

	1	2	6	7
A	✓	x	x	x
B	✓	✓	x	x
C	x	x	x	✓
D	x	x	✓	✓

- 8 Which atom has twice as many neutrons as protons?

- A ${}^1_1\text{H}$ B ${}^2_1\text{H}$ C ${}^3_1\text{H}$ D ${}^4_2\text{He}$

9 Magnesium and sulphur each form a chloride.

What could be the formulae of these chlorides?

	magnesium	sulphur
A	Mg_2Cl	S_2Cl
B	Mg_2Cl	SCl_2
C	$MgCl_2$	S_2Cl
D	$MgCl_2$	SCl_2

10 A gas has the molecular formula $NOCl$.

Which diagram could show molecules of the pure gas $NOCl$?

A **B**

key

○ Cl

● N

● O

C **D**

11 The electrolysis of concentrated aqueous sodium chloride makes three products.

Which products are shown at the correct electrodes?

	anode (+ve)	cathode (-ve)
A	chlorine	sodium hydroxide
B	sodium hydroxide	chlorine
C	hydrogen	sodium
D	sodium	hydrogen

12 Aluminium is extracted from its oxide by electrolysis. To do so, the oxide is dissolved.

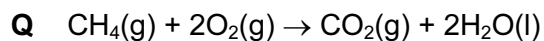
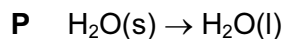
Which substance is used to dissolve aluminium oxide and where is aluminium deposited during the electrolysis?

	substance used to dissolve aluminium oxide	where aluminium is deposited
A	cryolite	anode (+ve)
B	cryolite	cathode (-ve)
C	water	anode (+ve)
D	water	cathode (-ve)

13 Which piece of apparatus is essential to measure the speed of a reaction?

- A** accurate balance
- B** gas syringe
- C** stopwatch
- D** thermometer

14 Equations for two changes **P** and **Q** are shown.



Which of these changes are exothermic?

	P	Q
A	✓	✓
B	✓	x
C	x	✓
D	x	x

15 The decomposition of glucose, in aqueous solution, to form ethanol and carbon dioxide is catalysed by an enzyme in yeast.

Which change increases the rate of this decomposition?

- A** add more water to the solution
- B** cool the solution
- C** heat the solution to boiling point
- D** heat the solution to 30 °C

16 Which equation shows an oxidation reaction?

- A** $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- B** $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- C** $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
- D** $\text{N}_2\text{O}_4 \rightarrow 2\text{NO}_2$

17 Acids react with bases, carbonates and metals.

Which of these reactions produce a gas?

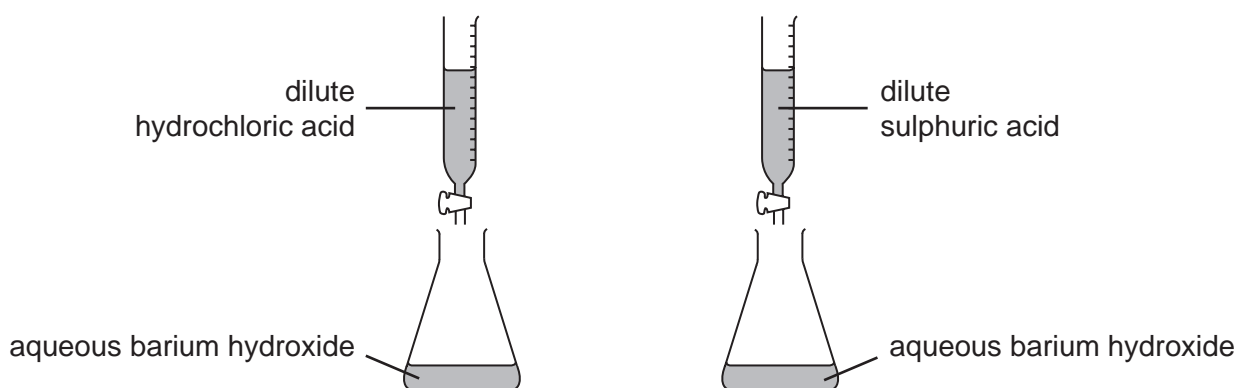
	reaction of acid with a		
	base	carbonate	metal
A	✓	✓	✓
B	✓	x	x
C	x	✓	✓
D	x	✓	x

18 Which properties does an acid have?

- 1 reacts with ammonium sulphate to form ammonia
- 2 turns red litmus blue

	1	2
A	✓	✓
B	✓	x
C	x	✓
D	x	x

19 The diagrams show two experiments, one to make barium chloride and the other to make barium sulphate.

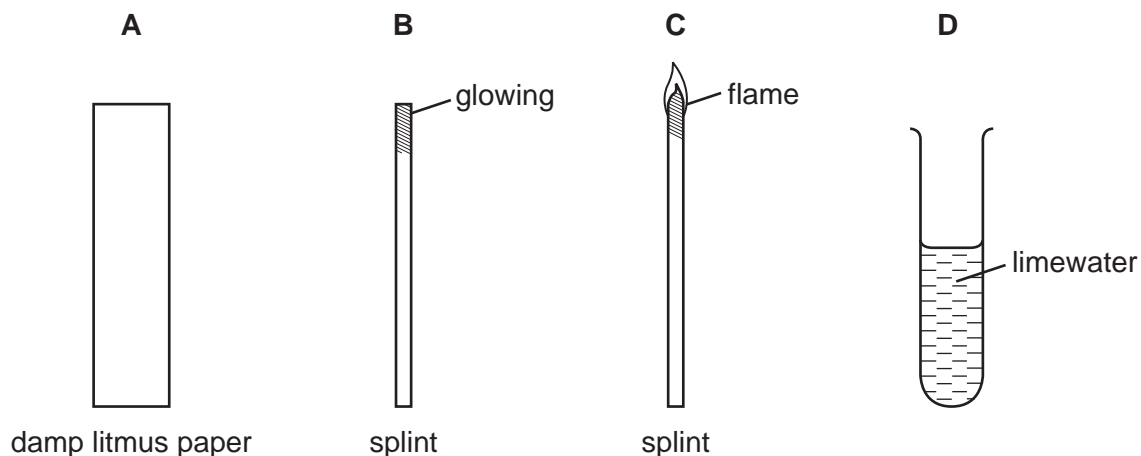


In each experiment, the acid is run into the conical flask until the resulting liquid has pH7.

What are the next steps to obtain samples of the solid salts?

	barium chloride	barium sulphate
A	crystallisation	crystallisation
B	crystallisation	filtration
C	filtration	crystallisation
D	filtration	filtration

20 Which piece of equipment can be used to show that a gas is hydrogen?



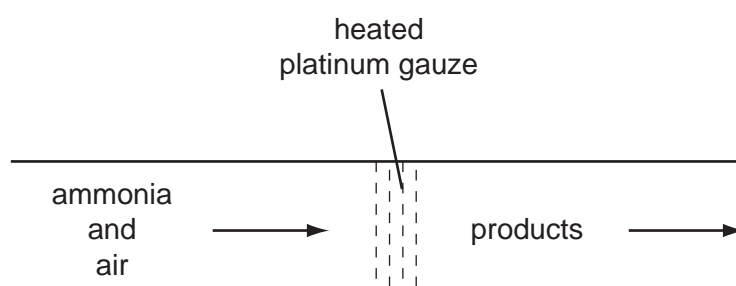
21 The statements are about metals and their oxides.

Metals ...X... electrons to form ions. The oxides of metals are ...Y....

Which words correctly complete the statements?

	X	Y
A	gain	acidic
B	gain	basic
C	lose	acidic
D	lose	basic

22 The diagram shows one stage in the manufacture of nitric acid from ammonia.

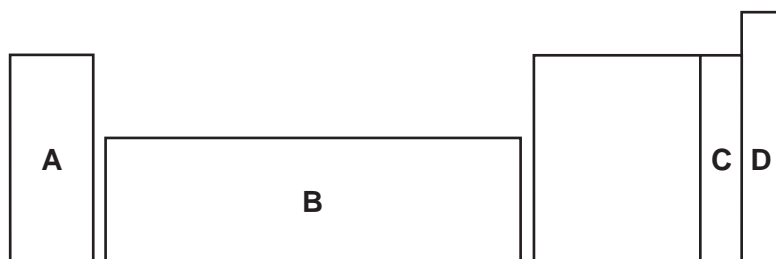


What could be the use of the platinum gauze in this process?

- A** as a base
- B** as a catalyst
- C** as a filter
- D** as a fuel

23 An element does not conduct electricity but it does exist as diatomic molecules.

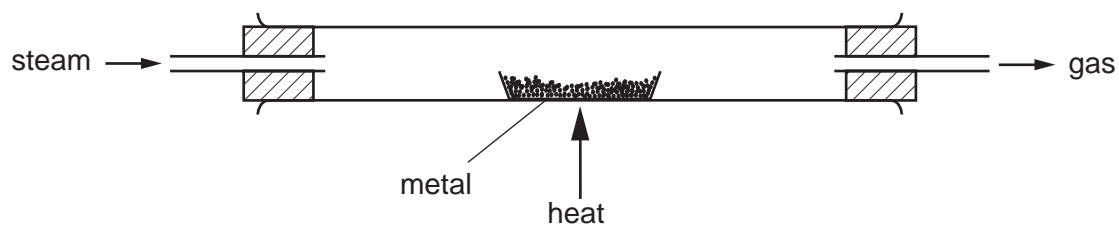
In which area of the Periodic Table is the element to be found?



24 Which properties of helium explain its use in filling balloons?

	low density	its unreactivity
A	✓	✓
B	✓	x
C	x	✓
D	x	x

25 The diagram shows apparatus used to test the reactivity of calcium, copper and magnesium with steam.



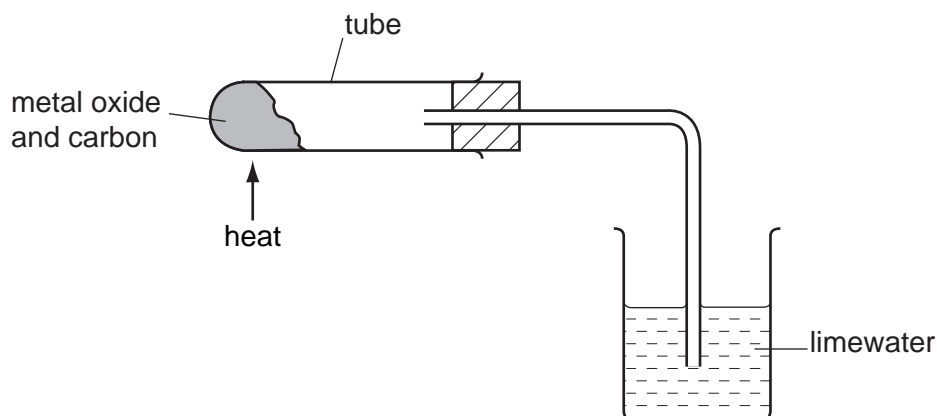
Which metals react with steam to form hydrogen?

	calcium	copper	magnesium
A	✓	✓	x
B	✓	x	✓
C	x	✓	x
D	x	x	✓

26 Which types of steel are used in chemical plants and machinery?

	chemical plant	machinery
A	mild steel	mild steel
B	mild steel	stainless steel
C	stainless steel	mild steel
D	stainless steel	stainless steel

27 In separate experiments, mixtures of CuO/C and of MgO/C are strongly heated in the apparatus shown.



What happens to the limewater in these experiments?

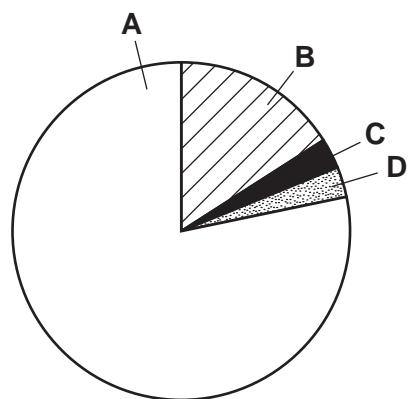
	CuO/C	MgO/C
A	goes cloudy	goes cloudy
B	goes cloudy	stays clear
C	stays clear	goes cloudy
D	stays clear	stays clear

28 Which raw materials are used in the manufacture of iron?

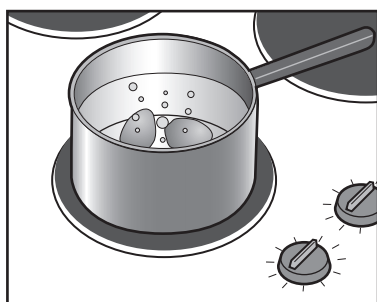
- A** bauxite and lime
- B** bauxite and limestone
- C** hematite and lime
- D** hematite and limestone

29 The diagram represents the composition of dry air.

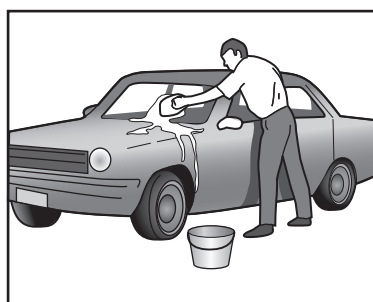
Which part shows the percentage of nitrogen in the air?



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



1



2



3

For which of these uses is it important for the water to have been purified?

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

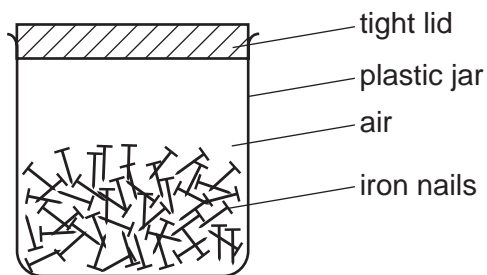
31 The listed pollutants are sometimes found in car exhaust fumes.

- 1 carbon monoxide
- 2 nitrogen oxides
- 3 sulphur dioxide

Which of these pollutants are products of the combustion of the fuel?

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

32 A shopkeeper stores iron nails in an airtight container, as shown in the diagram.



The nails begin to rust after a few days.

How can the rusting of the nails be prevented?

- A leave the lid off
- B put a drying agent in the jar
- C put the jar in a warm place
- D seal the jar in a bag

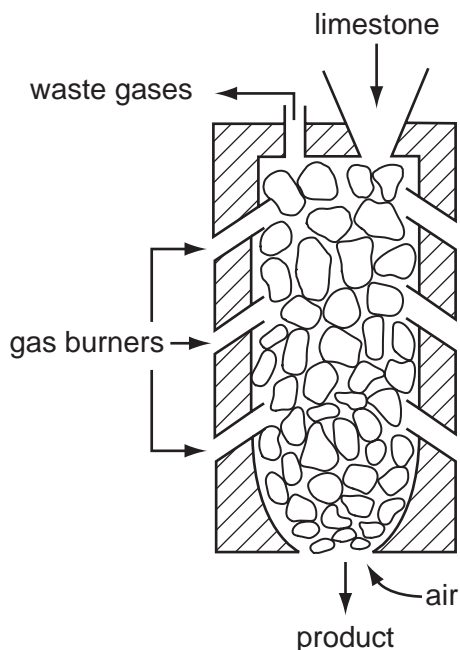
33 Two uses of oxygen are

- 1 burning acetylene in welding,
- 2 helping the breathing of hospital patients.

Which of these uses form carbon dioxide?

	use 1	use 2
A	✓	✓
B	✓	x
C	x	✓
D	x	x

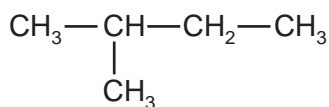
34 The diagram shows a kiln used to heat limestone.



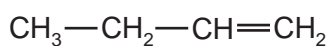
What is the product and what waste gas is formed?

	product	waste gas
A	lime	carbon monoxide
B	lime	carbon dioxide
C	slaked lime	carbon monoxide
D	slaked lime	carbon dioxide

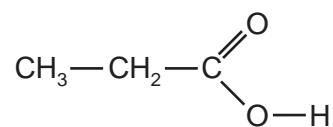
35 The structures of three compounds are shown.



X



Y



Z

What are **X**, **Y** and **Z**?

	X	Y	Z
A	alkane	alkene	alcohol
B	alkane	alkene	carboxylic acid
C	alkene	alkane	alcohol
D	alkene	alkane	carboxylic acid

36 How many oxygen atoms and double bonds are there in one molecule of ethanoic acid?

	number of oxygen atoms	number of double bonds
A	1	0
B	1	1
C	2	0
D	2	1

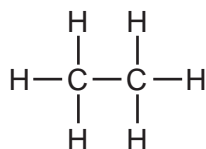
37 Compounds R and S occur naturally.

R is C_6H_{14} and S is $C_6H_{12}O_6$.

Which of the terms **hydrocarbon** and **occurs in crude oil** describe R and S?

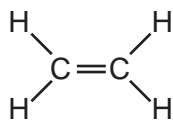
	hydrocarbon	occurs in crude oil
A	R only	R only
B	R only	S only
C	S only	R only
D	S only	S only

38 The diagram shows an ethane molecule.

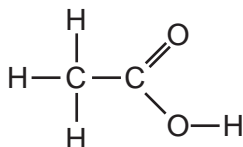


Which compound has chemical properties similar to those of ethane?

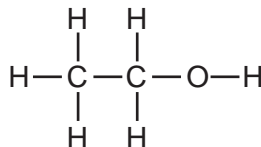
A



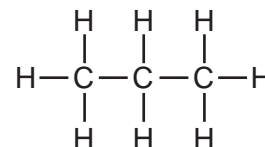
B



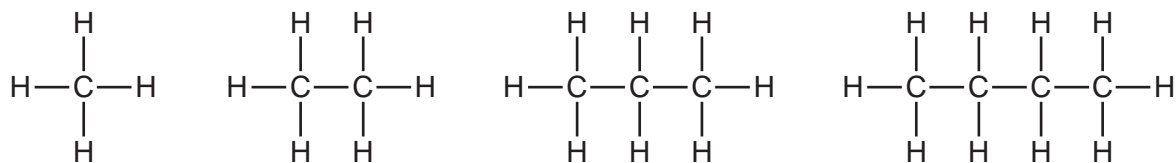
C



D



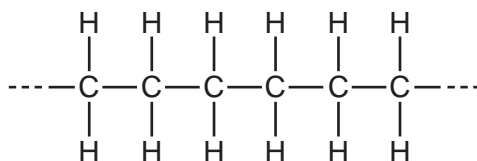
39 The diagram shows the first four members of a homologous series.



What is the difference in molecular formula between one member and the next in the series?

- A** CH **B** CH₂ **C** CH₃ **D** CH₄

40 The diagram shows part of a polymer.



Which compound is used as the monomer?

- A** C₂H₄
B C₂H₆
C C₆H₁₂
D C₆H₁₄

DATA SHEET The Periodic Table of the Elements

Group																	
I	II	III	IV	V	VI	VII	0										
1 H Hydrogen 1																	
		4 He Helium 2															
9 Be Beryllium 4																	
23 Na Sodium 11		12 C Carbon 6															
39 K Potassium 19		14 N Nitrogen 7															
85 Rb Rubidium 37		16 O Oxygen 8															
133 Cs Caesium 55		18 Ar Argon 18															
226 Ra Radium 88		20 Ne Neon 10															
227 Ac Actinium 89 †		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															
		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															
		104 Rf Rutherfordium 104															
		105 Db Dubnium 105															
		106 Sg Seaborgium 106															
		107 Bh Bohrium 107															
		108 Hs Hassium 108															
		109 Mt Meitnerium 109															
		110 Ds Darmstadtium 110															
		111 Rg Roentgenium 111															
		112 Cn Copernicium 112															
		113 Nh Nihonium 113															
		114 Fl Flerovium 114															
		115 Mc Moscovium 115															
		116 Lv Livermorium 116															
		117 Ts Tennessine 117															
		118 Og Oganesson 118															

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

a	X
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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