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.

1 In which change of state do the particles become more widely separated?

A gas to liquid

B gas to solid

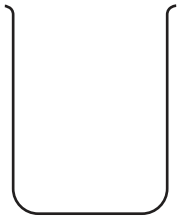
C liquid to gas

D liquid to solid

2 A student mixes 25 cm^3 samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide. Each time, the student measures the change in temperature.

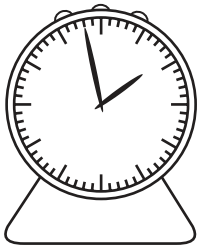
Which piece of apparatus is **not** needed?

A



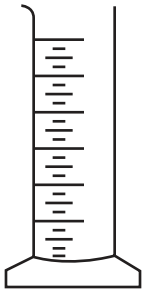
beaker

B



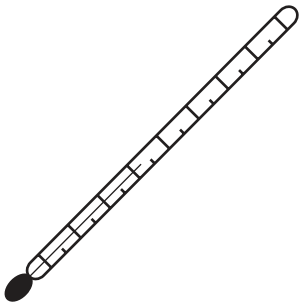
clock

C



measuring cylinder

D



thermometer

3 Which piece of apparatus should be used for the **accurate** measurement of 30.0 cm^3 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

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	✓	✗	✗	✗
B	✓	✓	✗	✗
C	✗	✗	✗	✓
D	✗	✗	✓	✓

8 Which atom has twice as many neutrons as protons?

A $^{1}_{1}H$ **B** $^{2}_{1}H$ **C** $^{3}_{1}H$ **D** $^{4}_{2}He$

9 Magnesium and sulphur each form a chloride.

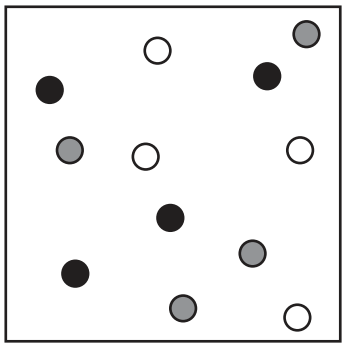
What could be the formulae of these chlorides?

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

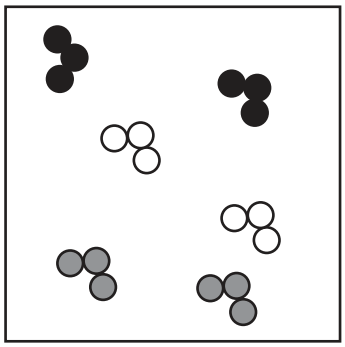
10 A gas has the molecular formula $NOCl$.

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

A



B



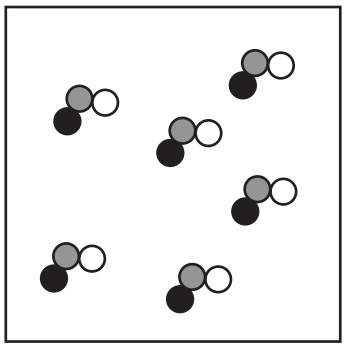
key

○ Cl

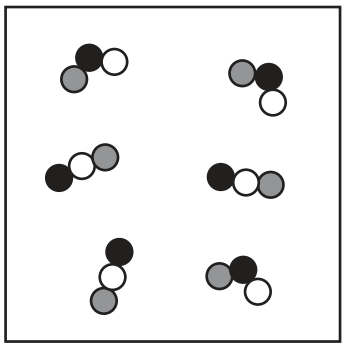
● N

● 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

[Turn over

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

P $H_2O(s) \rightarrow H_2O(l)$

Q $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$

Which of these changes are exothermic?

	P	Q
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

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 $C + O_2 \rightarrow CO_2$

B $CaCO_3 \rightarrow CaO + CO_2$

C $2H_2O_2 \rightarrow 2H_2O + O_2$

D $N_2O_4 \rightarrow 2NO_2$

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	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

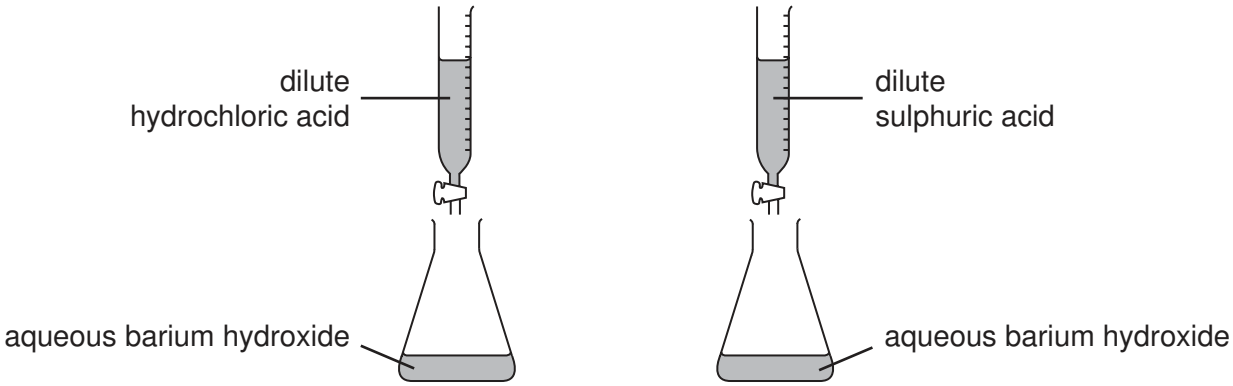
18 Which properties does an acid have?

1 reacts with ammonium sulphate to form ammonia

2 turns red litmus blue

	1	2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

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

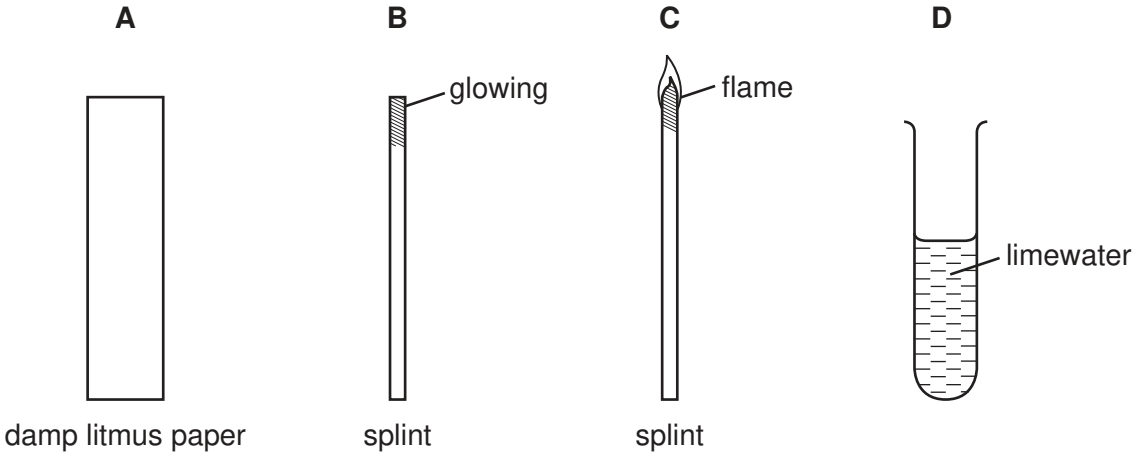


In each experiment, the acid is run into the conical flask until the resulting liquid has pH7.

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?



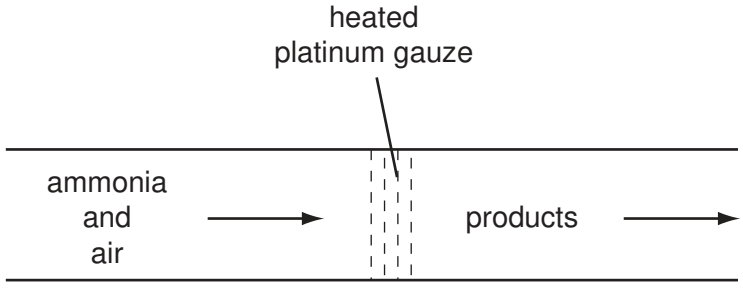
21 The statements are about metals and their oxides.

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

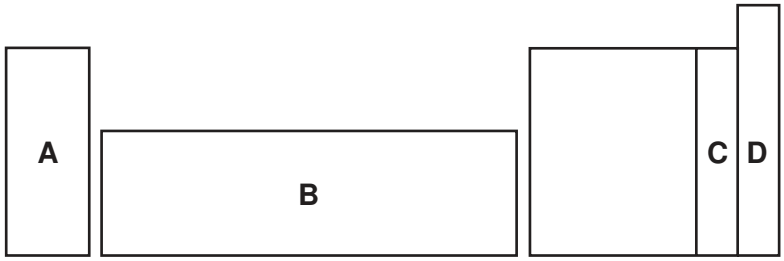
B as a catalyst

C as a filter

D as a fuel

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

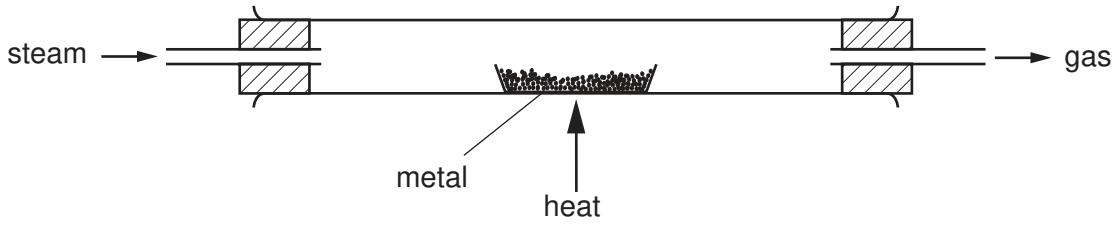
In which area of the Periodic Table is the element to be found?



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

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

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



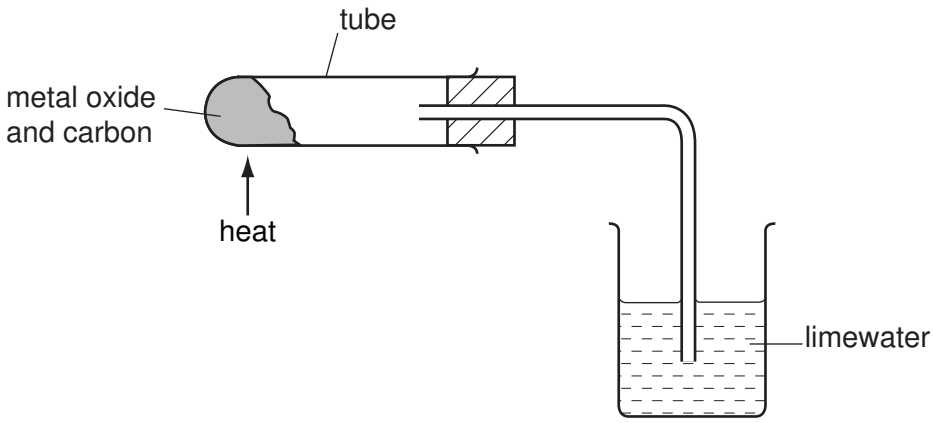
Which metals react with steam to form hydrogen?

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

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

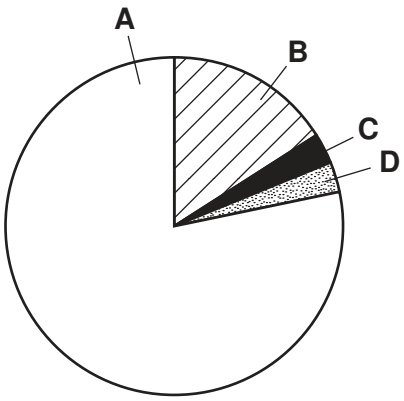
B bauxite and limestone

C hematite and lime

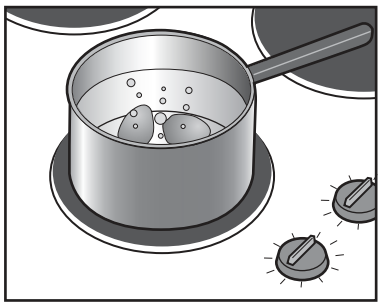
D hematite and limestone

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

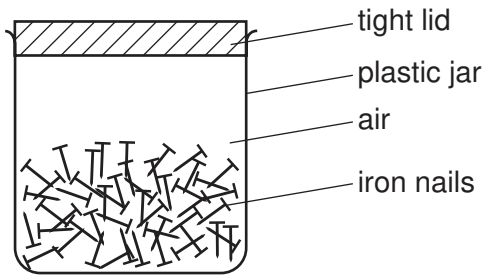
B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

[Turn over

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

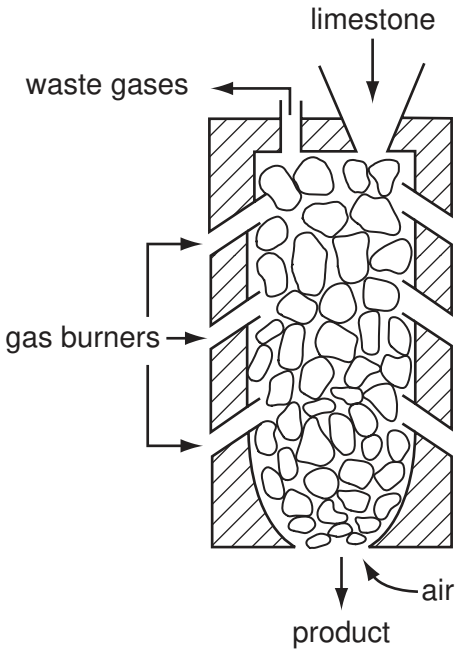
1 burning acetylene in welding,

2 helping the breathing of hospital patients.

Which of these uses form carbon dioxide?

	use 1	use 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

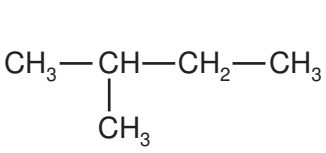
34 The diagram shows a kiln used to heat limestone.



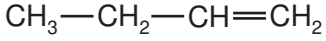
What is the product and what waste gas is formed?

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

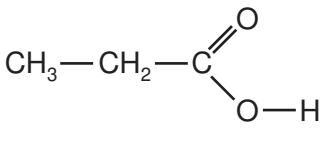
35 The structures of three compounds are shown.



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

[Turn over

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

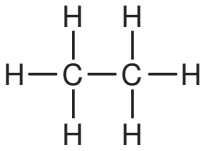
37 Compounds R and S occur naturally.

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?

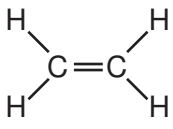
	hydrocarbon	occurs in crude oil
A	R only	R only
B	R only	S only
C	S only	R only
D	S only	S only

38 The diagram shows an ethane molecule.

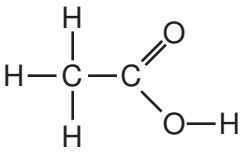


Which compound has chemical properties similar to those of ethane?

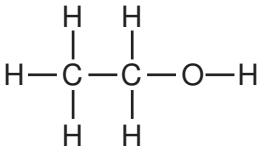
A



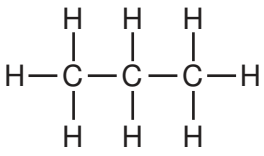
B



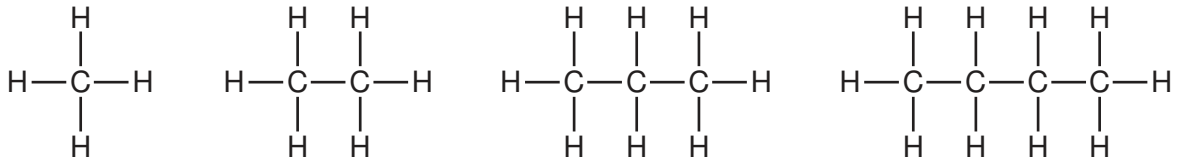
C



D



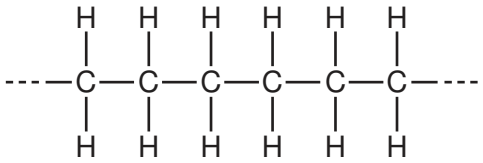
39 The diagram shows the first four members of a homologous series.



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

A CH **B** CH_2 **C** CH_3 **D** CH_4

40 The diagram shows part of a polymer.



Which compound is used as the monomer?

A C_2H_4

B C_2H_6

C C_6H_{12}

D C_6H_{14}

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 Sulphur 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	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 = relative atomic mass; X = atomic symbol; b = proton (atomic) number

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