



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY

0620/13

Paper 1 Multiple Choice

October/November 2010

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 changes do the particles move further apart?



- A** W and X **B** W and Z **C** X and Y **D** Y and Z

- 2 The table shows the structure of different atoms and ions.

particle	proton number	nucleon number	number of protons	number of neutrons	number of electrons
Mg	12	24	12	W	12
Mg ²⁺	X	24	12	12	10
F	9	19	9	Y	9
F ⁻	9	19	9	10	Z

What are the values of W, X, Y and Z?

	W	X	Y	Z
A	10	10	9	9
B	10	12	10	9
C	12	10	9	10
D	12	12	10	10

- 3 Element X has a nucleon (mass) number of 19 and a proton (atomic) number of 9.

To which group in the Periodic Table does it belong?

- A** I **B** III **C** VII **D** 0

- 4 A mixture of ethanol and methanol are separated by fractional distillation.

This method of separation depends on a difference in property X of these two alcohols.

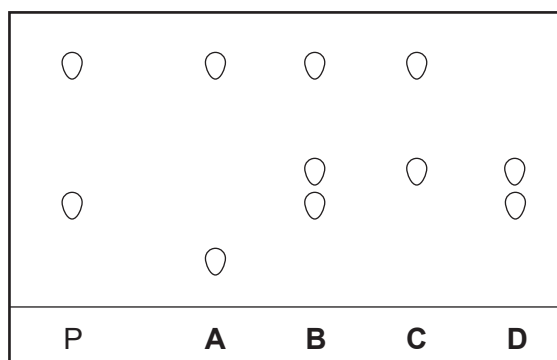
What is property X?

- A** boiling point
B colour
C melting point
D solubility

- 5 Chromatography is used to find out if a banned dye, P, is present in foodstuffs.

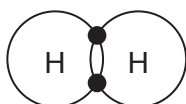
The results are shown in the diagram.

Which foodstuff contains P?

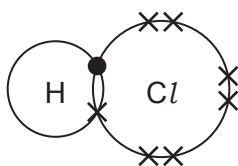


- 6 Which diagram does **not** show the outer shell electrons in the molecule correctly?

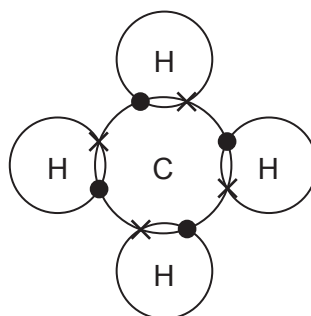
A



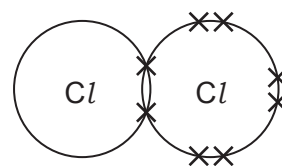
B



C

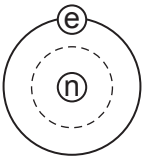
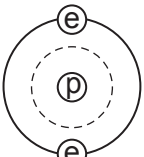
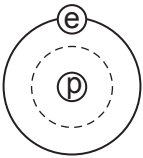
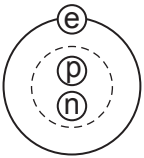
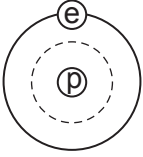
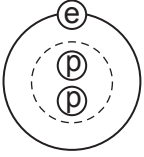
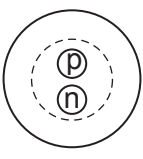
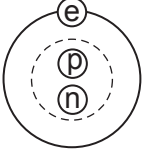


D

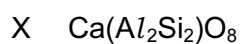
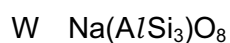


- 7 Two isotopes of hydrogen are ${}^1_1\text{H}$ and ${}^2_1\text{H}$.

Which diagram shows the arrangement of particles in the two isotopes?

	${}^1_1\text{H}$	${}^2_1\text{H}$	
A			key ⓔ = an electron Ⓟ = a proton Ⓝ = a neutron ○ = a nucleus
B			
C			
D			

- 8 The chemical compositions of two substances, W and X, are given.

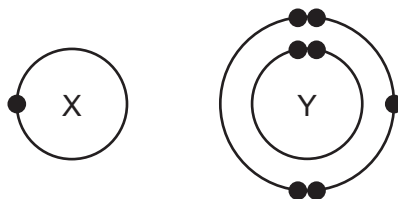


Which statements are correct?

- 1 W and X contain the same amount of oxygen.
- 2 W contains three times as much silicon as X.
- 3 X contains twice as much aluminium as W.

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

- 9 The electronic structures of atoms X and Y are shown.



X and Y form a covalent compound.

What is its formula?

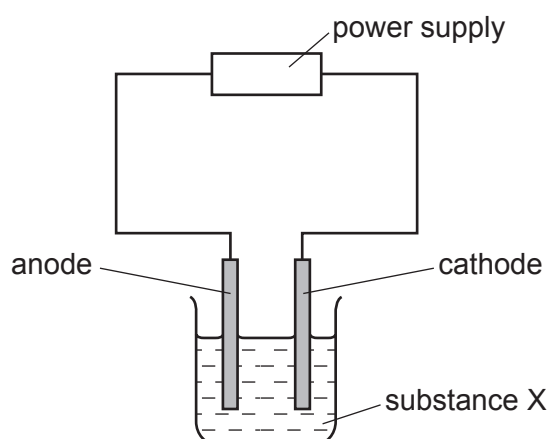
- A** XY_5 **B** XY_3 **C** XY **D** X_3Y
- 10 Element X is shiny and can be formed into a sheet by hammering.

Which row correctly describes the properties of element X?

	conducts electricity	melts below 25°C
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 11 Substance X was electrolysed in an electrolytic cell.

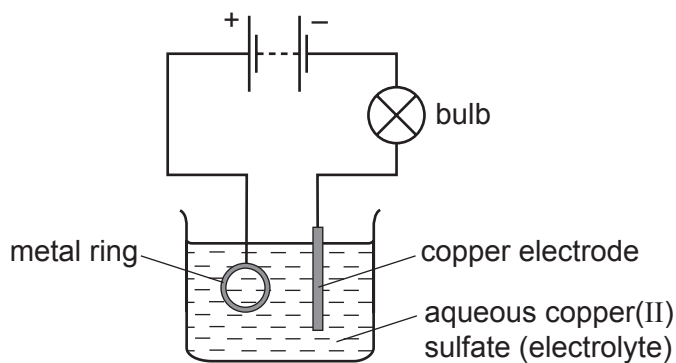
A coloured gas was formed at the anode and a metal was formed at the cathode.



What is substance X?

- A** aqueous sodium chloride
B molten lead bromide
C molten zinc oxide
D solid sodium chloride

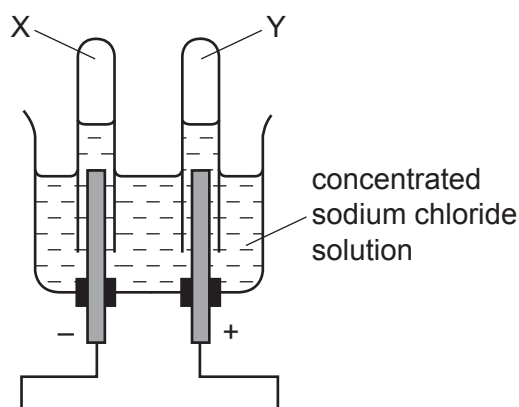
- 12 The diagram shows apparatus used in an attempt to electroplate a metal ring with copper.



The experiment did not work.

What change is needed in the experiment to make it work?

- A Add solid copper(II) sulfate to the electrolyte.
 - B Increase the temperature of the electrolyte.
 - C Replace the copper electrode by a carbon electrode.
 - D Reverse the connections to the battery.
- 13 When concentrated sodium chloride solution is electrolysed, elements X and Y are formed.



What are X and Y?

	X	Y
A	chlorine	hydrogen
B	hydrogen	chlorine
C	hydrogen	oxygen
D	oxygen	hydrogen

- 14** Calcium carbonate was reacted with hydrochloric acid in a conical flask. The flask was placed on a balance and the mass of the flask and contents was recorded as the reaction proceeded.

During the reaction, carbon dioxide gas was given off.

The reaction was carried out at two different temperatures.

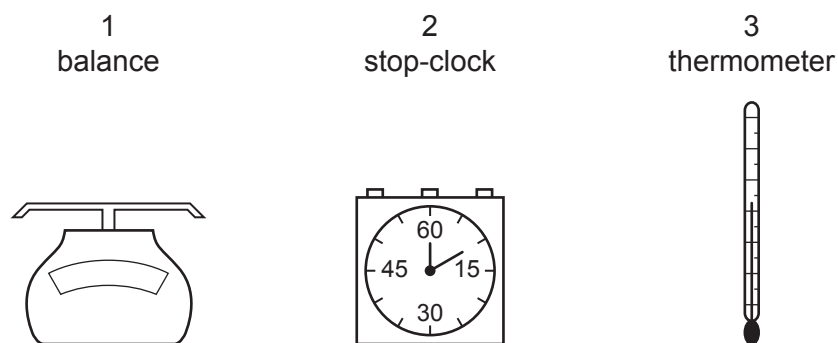
Which row is correct?

	change in mass	temperature at which mass changed more quickly
A	decrease	higher temperature
B	decrease	lower temperature
C	increase	higher temperature
D	increase	lower temperature

- 15** Which is an endothermic process?

- A** burning hydrogen
- B** distilling petroleum
- C** reacting potassium with water
- D** using petrol in a motor car engine

- 16** The diagrams show some pieces of laboratory equipment.



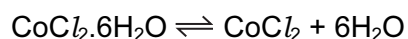
Which equipment is needed to find out whether dissolving salt in water is an endothermic process?

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

17 Which reaction will result in a decrease in pH?

- A adding calcium hydroxide to acid soil
- B adding citric acid to sodium hydrogen carbonate solution
- C adding sodium chloride to silver nitrate solution
- D adding sodium hydroxide to hydrochloric acid

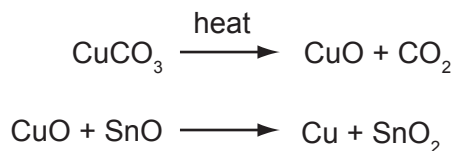
18 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.



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

19 The red colour in some pottery glazes may be formed as a result of the reactions shown.



These equations show that 1..... is oxidised and 2..... is reduced.

Which substances correctly complete gaps 1 and 2 in the above sentence?

	1	2
A	CO ₂	SnO ₂
B	CuCO ₃	CuO
C	CuO	SnO
D	SnO	CuO

- 20** Some barium iodide is dissolved in water.

Aqueous lead(II) nitrate is added to the solution until no more precipitate forms.

This precipitate, X, is filtered off.

Dilute sulfuric acid is added to the filtrate and another precipitate, Y, forms.

What are the colours of precipitates X and Y?

	X	Y
A	white	white
B	white	yellow
C	yellow	white
D	yellow	yellow

- 21** The table shows some reactions of the halogens.

Which reaction is the most likely to be explosive?

reaction	chlorine gas	bromine gas	iodine gas
reaction with hydrogen	A	B	C
reaction with iron	very vigorous	less vigorous	D

- 22** Which compound is likely to be coloured?

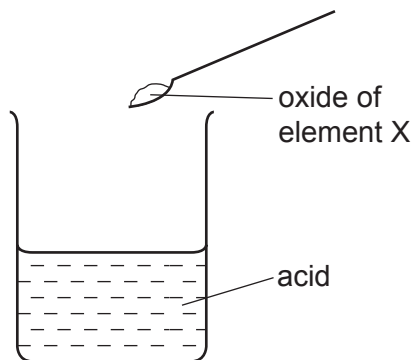
A KMnO_4 **B** KNO_3 **C** K_2CO_3 **D** K_2SO_4

- 23** A salt is made by adding an excess of an insoluble metal oxide to an acid.

How can the excess metal oxide be removed?

- A** chromatography
B crystallisation
C distillation
D filtration

- 24** The oxide of element X was added to an acid. It reacted to form a salt and water.



What is the pH of the acid before the reaction and what type of element is X?

	pH	type of element X
A	greater than 7	metal
B	greater than 7	non-metal
C	less than 7	metal
D	less than 7	non-metal

- 25** The diagram shows the positions of elements P, Q, R, S and T in the Periodic Table.

These letters are not the chemical symbols for the elements.

[illegible]

Which statement about the properties of these elements is correct?

- A** P reacts more vigorously with water than does Q.
- B** P, Q and R are all metals.
- C** T exists as diatomic molecules.
- D** T is more reactive than S.

- 26 The table compares the properties of Group I elements with those of transition elements.

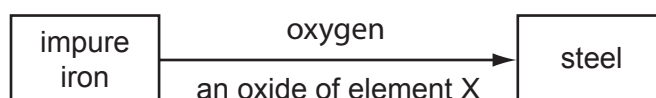
Which entry in the table is correct?

	property	Group I elements	transition elements
A	catalytic activity	low	high
B	density	high	low
C	electrical conductivity	low	high
D	melting point	high	low

- 27 Which pollutant, found in car exhaust fumes, does **not** come from the fuel?

- A** carbon monoxide
- B** hydrocarbons
- C** lead compounds
- D** nitrogen oxides

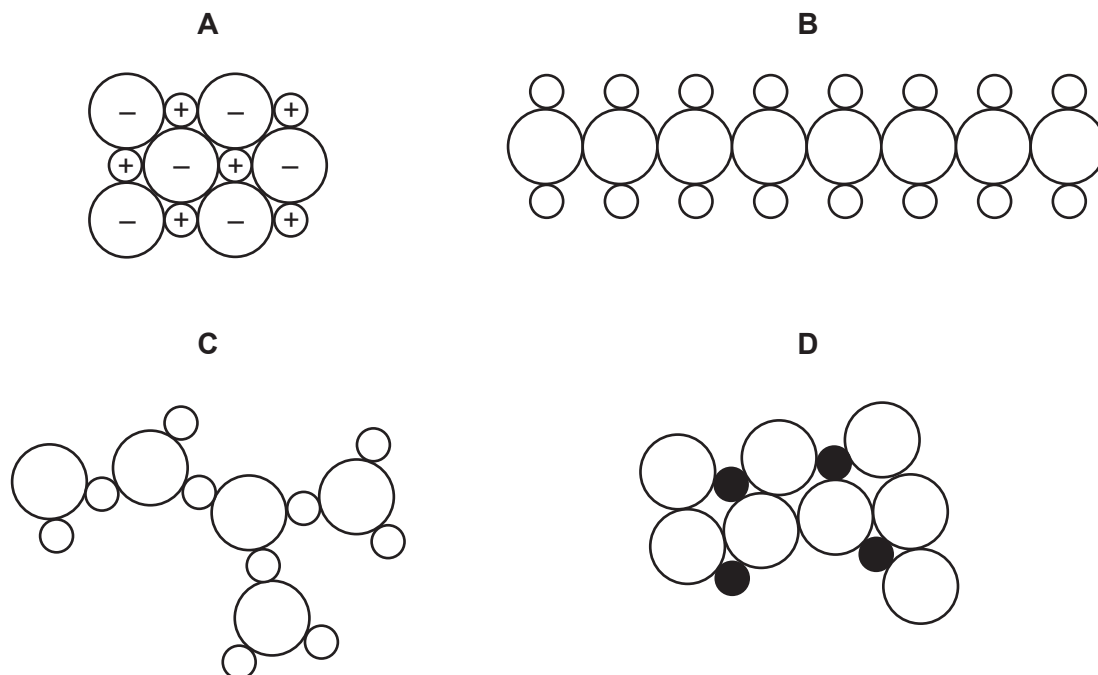
- 28 The diagram shows the materials used in the production of steel from impure iron.



What could element X be?

- A** calcium
 - B** carbon
 - C** nitrogen
 - D** sulfur
- 29 Which property do **all** metals have?
- A** Their boiling points are low.
 - B** Their densities are low.
 - C** They conduct electricity.
 - D** They react with water.

30 Which diagram could represent the structure of an alloy?



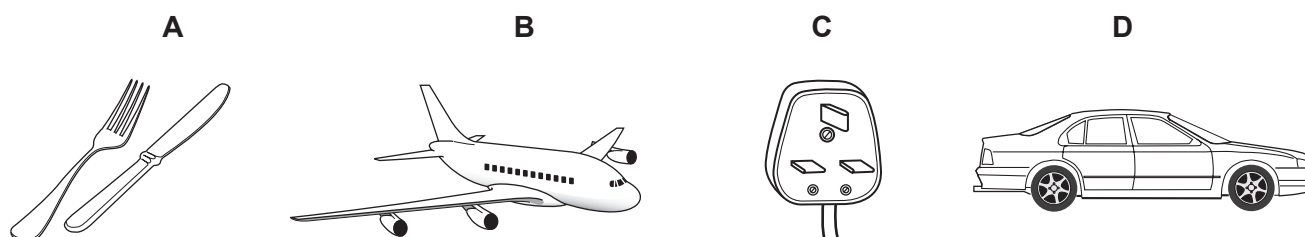
31 Some metals react readily with dilute hydrochloric acid.

Some metals can be extracted by heating their oxides with carbon.

For which metal are **both** statements correct?

- A** calcium
- B** copper
- C** iron
- D** magnesium

32 Which diagram shows a common use of stainless steel?

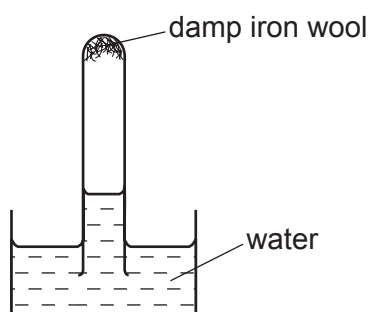


33 Why is chlorination used in water treatment?

- A** to kill bacteria in the water
- B** to make the water neutral
- C** to make the water taste better
- D** to remove any salt in the water

34 A test-tube containing damp iron wool is inverted in water.

After three days, the water level inside the test-tube has risen.



Which statement explains this rise?

- A** Iron oxide has been formed.
- B** Iron wool has been reduced.
- C** Oxygen has been formed.
- D** The temperature of the water has risen.

35 A bag of fertiliser 'Watch it grow' contains ammonium sulfate and potassium sulfate.

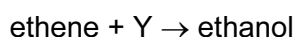
Which of the three elements N, P and K does 'Watch it grow' contain?

	N	P	K
A	✓	✓	x
B	✓	x	✓
C	x	✓	x
D	x	x	✓

36 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

37 Ethene reacts with Y to produce ethanol.

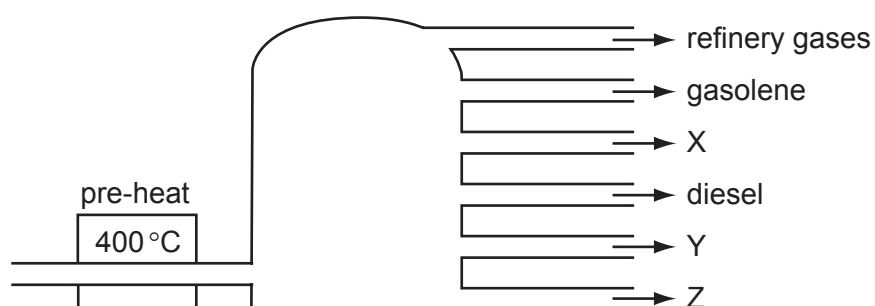


What is Y?

- A** hydrogen
- B** oxygen
- C** steam
- D** yeast

38 In an oil refinery, crude oil is separated into useful fractions.

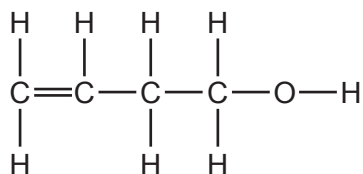
The diagram shows some of these fractions.



What are fractions X, Y and Z?

	X	Y	Z
A	fuel oil	bitumen	paraffin (kerosene)
B	fuel oil	paraffin (kerosene)	bitumen
C	paraffin (kerosene)	bitumen	fuel oil
D	paraffin (kerosene)	fuel oil	bitumen

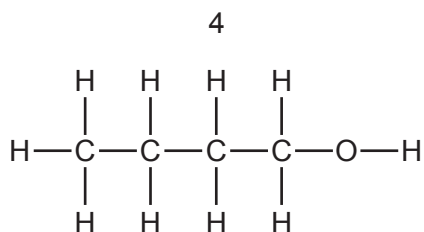
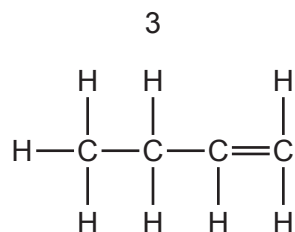
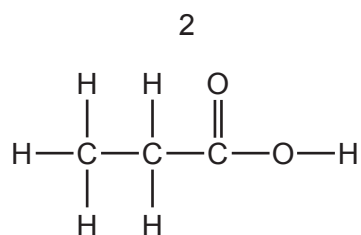
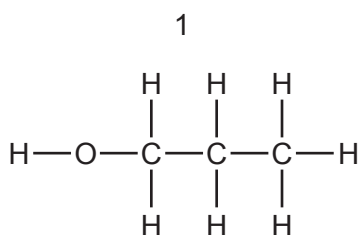
39 The diagram shows the structure of a compound.



To which classes of compound does this molecule belong?

	alkane	alkene	alcohol
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	yes

40 Which structures show compounds that are members of the same homologous series?



A 1 and 2

B 1 and 4

C 2 and 3

D 3 and 4

DATA SHEET
The Periodic Table of the Elements

Group																		
I	II											III	IV	V	VI	VII	0	
		1 H Hydrogen																4 He Helium
																	2	
7 Li Lithium	9 Be Beryllium											11 B Boron	12 C Carbon	14 N Nitrogen	16 O Oxygen	19 F Fluorine	20 Ne Neon	
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon	
19 K Potassium	20 Ca Calcium	45 Sc Scandium	48 Ti Titanium	51 V Vanadium	52 Cr Chromium	55 Mn Manganese	56 Fe Iron	59 Co Cobalt	59 Ni Nickel	64 Cu Copper	65 Zn Zinc	70 Ga Gallium	73 Ge Germanium	75 As Arsenic	79 Se Selenium	84 Kr Krypton		
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	54 Xe Xenon		
55 Cs Caesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	86 Rn Radon		
87 Fr Francium	88 Ra Radium	89 Ac Actinium																
58-71 Lanthanoid series																		
90-103 Actinoid series																		
a X b a = relative atomic mass X = atomic symbol b = proton (atomic) number																		
				140 Ce Cerium	141 Pr Praseodymium	144 Nd Neodymium	61 Pm Promethium	150 Sm Samarium	63 Eu Europium	157 Gd Gadolinium	65 Tb Terbium	162 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	71 Lu Lutetium		
		232 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium			

Key

a	X	b
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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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