



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CHEMISTRY**

**0620/12**

Paper 1 Multiple Choice

**October/November 2009**

**45 Minutes**

Additional Materials:      Multiple Choice Answer Sheet  
   Soft clean eraser  
   Soft pencil (type B or HB is recommended)

\* 5 1 5 1 3 6 8 2 8 5 \*

**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.

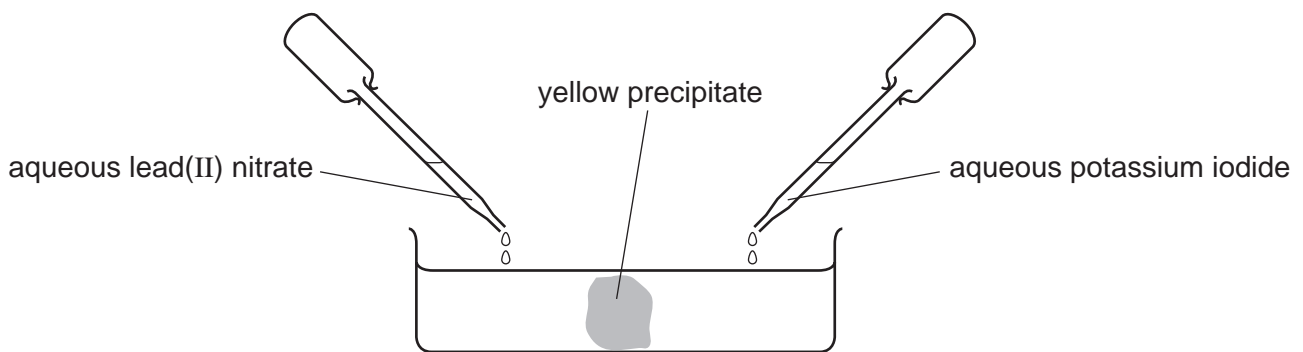


1 A student separates salt from a mixture of salt and sand.

What is the correct order of steps for the student to take?

- A filter → evaporate → shake with water
- B filter → shake with water → evaporate
- C shake with water → evaporate → filter
- D shake with water → filter → evaporate

2 Aqueous lead(II) nitrate and aqueous potassium iodide are added to a dish containing water, as shown.



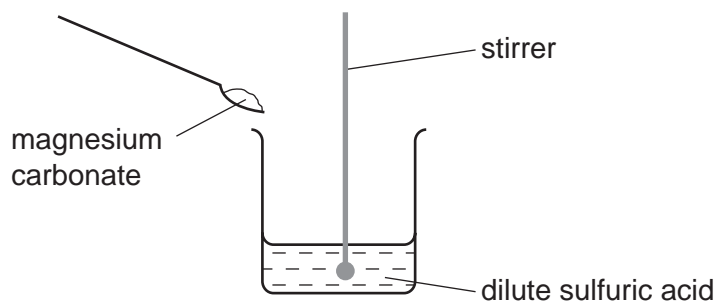
A yellow precipitate forms after a few minutes.

Which process occurs before the precipitate forms?

- A diffusion
- B distillation
- C fermentation
- D filtration

- 3 A student carries out an experiment to prepare pure magnesium sulfate crystals.

The diagram shows the first stage of the preparation.



He adds magnesium carbonate until no more reacts.

Which process should he use for the next stage?

- A crystallisation
  - B evaporation
  - C filtration
  - D neutralisation
- 4 Which change to an atom occurs when it forms a positive ion?
- A It gains electrons.
  - B It gains protons.
  - C It loses electrons.
  - D It loses protons.
- 5 Statements 1, 2 and 3 are about diamond and graphite.
- 1 They are different solid forms of the same element.
  - 2 They each conduct electricity.
  - 3 They have atoms that form four equally strong bonds.

Which statements are correct?

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

- 6 Covalent bonds are formed when electrons are .....1..... . Covalent compounds have .....2..... electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	shared	high
<b>B</b>	shared	low
<b>C</b>	transferred	high
<b>D</b>	transferred	low

- 7 Atom X has 8 more electrons than atom Y.

Student 1 says they are in the same group.

Student 2 says they are unreactive.

Which students can be correct?

	student 1	student 2
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 8 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

- 9 Which atom has two more electrons than an atom of a noble gas?

**A** aluminium

**B** bromine

**C** calcium

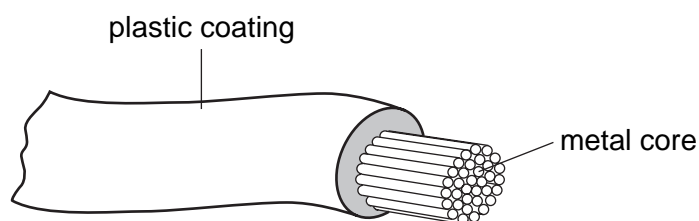
**D** rubidium

- 10 For each atom of carbon present in a molecule, there is an equal number of atoms of hydrogen and twice as many atoms of oxygen.

What is the formula of the molecule?

- A**  $C_2H_2O_2$       **B**  $C_2H_2O_4$       **C**  $C_2H_4O_2$       **D**  $C_2H_6O$
- 11 Water is formed when 48 g of oxygen combine with 6 g of hydrogen.
- What mass of oxygen combines with 2 g of hydrogen?
- A** 12 g      **B** 16 g      **C** 96 g      **D** 144 g

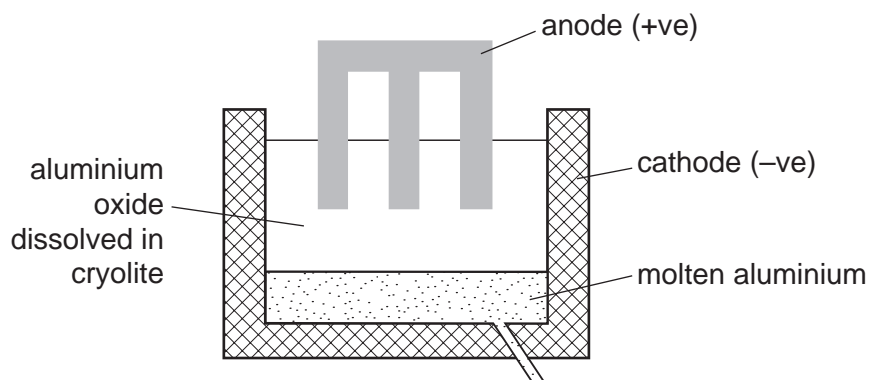
- 12 The diagram shows an electrical cable.



Which statement about the substances used is correct?

- A** The coating is plastic because it conducts electricity well.
- B** The core is copper because it conducts electricity well.
- C** The core is copper because it is cheap and strong.
- D** The core is iron because it is cheap and strong.

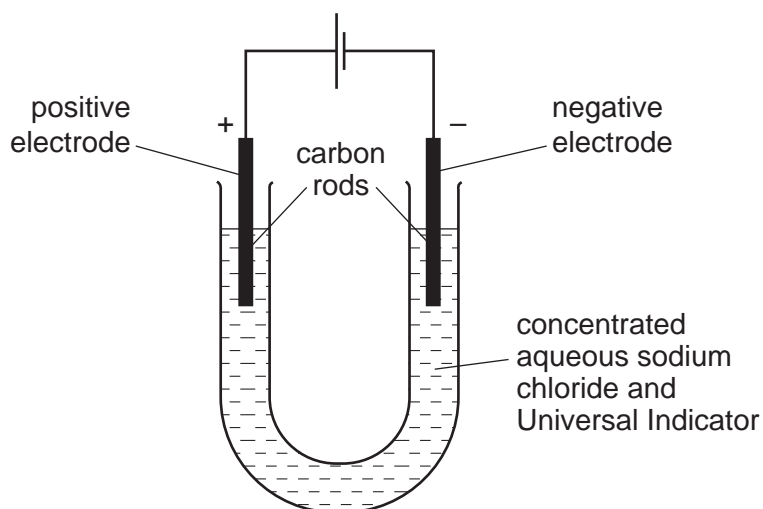
13 The diagram shows how aluminium is manufactured by electrolysis.



What are the anode and cathode made of?

	anode	cathode
<b>A</b>	aluminium	aluminium
<b>B</b>	aluminium	graphite
<b>C</b>	graphite	aluminium
<b>D</b>	graphite	graphite

14 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is the colour of the Universal Indicator at each electrode after five minutes?

	colour at anode (+ electrode)	colour at cathode (- electrode)
<b>A</b>	blue/purple	red
<b>B</b>	red	blue/purple
<b>C</b>	red	colourless
<b>D</b>	colourless	blue/purple

15 When an acid is added to an alkali the temperature rises.

Which words describe this reaction?

- A decomposition and endothermic
- B decomposition and exothermic
- C neutralisation and endothermic
- D neutralisation and exothermic

16 Substance X requires oxygen in order to produce energy.

It does **not** form carbon dioxide as a result of this energy production.

What is substance X?

- A hydrogen
- B natural gas
- C petrol
- D  $^{235}\text{U}$

17 Which change does **not** increase the speed of reaction between zinc and hydrochloric acid?

- A adding a catalyst
- B decreasing the temperature
- C decreasing the particle size of the zinc
- D using more concentrated acid

18 When blue copper(II) sulfate is heated, a white solid and water are formed.

The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reaction
A	a mixture	can be reversed
B	a mixture	cannot be reversed
C	hydrated	can be reversed
D	hydrated	cannot be reversed

19 The equations represent redox reactions.

In which equation is the underlined substance acting as a reducing agent?

- A CaO + H<sub>2</sub>O → Ca(OH)<sub>2</sub>  
 B CO<sub>2</sub> + C → 2CO  
 C CuO + H<sub>2</sub> → Cu + H<sub>2</sub>O  
 D 3CO + Fe<sub>2</sub>O<sub>3</sub> → 2Fe + 3CO<sub>2</sub>

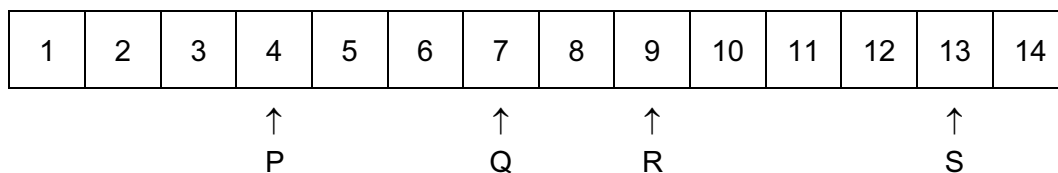
20 An aqueous solution Y contains both barium ions and silver ions.

In separate experiments, dilute sulfuric acid and dilute hydrochloric acid are added to solution Y.

Which of these acids causes a precipitate to form in solution Y?

	dilute sulfuric acid	dilute hydrochloric acid
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

21 The diagram shows the pH values of four solutions.



Which of these solutions are alkaline?

- A P only  
 B P and Q only  
 C Q, R and S only  
 D R and S only



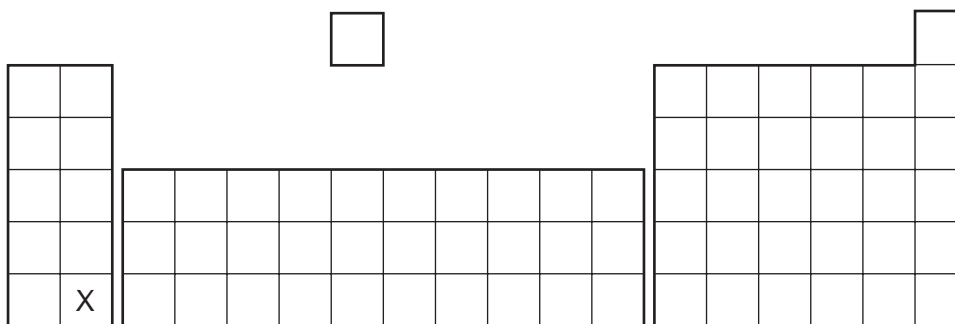
22 Salts can be prepared by reacting a dilute acid

- 1 with a metal;
- 2 with a base;
- 3 with a carbonate.

Which methods could be used to prepare copper(II) chloride?

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

23 The diagram shows the position of an element X in the Periodic Table.



What is the correct classification of element X and its oxide?

	X	oxide of X
<b>A</b>	metal	acidic
<b>B</b>	metal	basic
<b>C</b>	non-metal	acidic
<b>D</b>	non-metal	basic

24 Elements in Group 0 of the Periodic Table have uses.

These noble gases are .....1..... and this explains why argon .....2..... be used in lamps.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	reactive	can
<b>B</b>	reactive	cannot
<b>C</b>	unreactive	can
<b>D</b>	unreactive	cannot

- 25 Astatine is an element in Group VII of the Periodic Table. It has only ever been produced in small amounts.

What is the best description of its likely properties?

	colour	state	reaction with aqueous potassium iodide
<b>A</b>	black	solid	no reaction
<b>B</b>	dark brown	gas	brown colour
<b>C</b>	green	solid	no reaction
<b>D</b>	yellow	liquid	brown colour

- 26 Which property do **all** metals have?

- A** They are soluble in water.
- B** They conduct electricity.
- C** They have high melting points.
- D** They react with dilute sulfuric acid.

- 27 The table gives information about four elements.

Which element is a transition metal?

	colour of element	electrical conductivity of element	colour of oxide
<b>A</b>	black	high	colourless
<b>B</b>	colourless	low	white
<b>C</b>	grey	high	red
<b>D</b>	yellow	low	colourless

28 Some reactions of three metals are listed in the table.

metal	reacts with dilute hydrochloric acid	metal oxide is reduced by carbon
P	yes	yes
Q	no	yes
R	yes	no

What is the order of reactivity of the metals?

	most reactive	→	least reactive
<b>A</b>	P	R	Q
<b>B</b>	R	P	Q
<b>C</b>	R	Q	P
<b>D</b>	Q	P	R

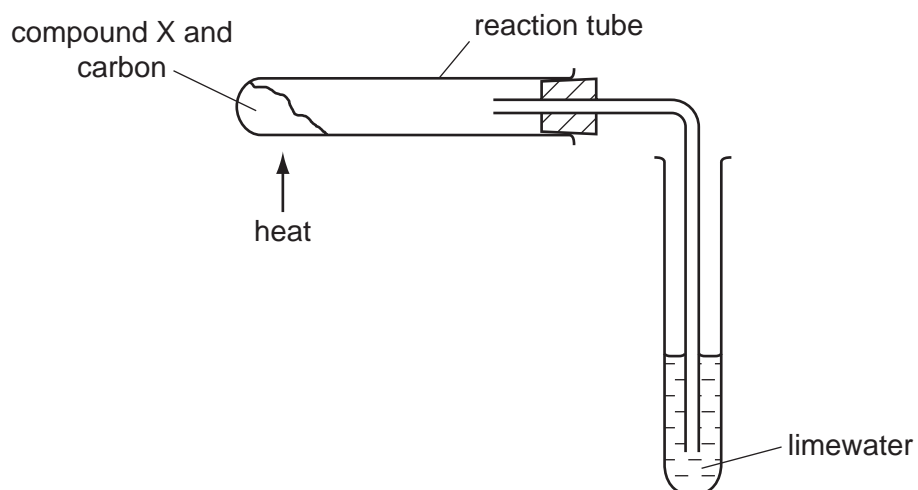
29 Which object is **least** likely to contain aluminium?

- A** a bicycle frame
- B** a hammer
- C** a saucepan
- D** an aeroplane body

30 Which statement about alloys is **not** correct?

- A** Alloys are more expensive than the metals they are made from.
- B** Alloys are mixtures of different metals.
- C** Alloys are not as strong as the metals they are made from.
- D** Alloys conduct electricity well.

31 Compound X is heated with carbon using the apparatus shown.



A brown solid is formed in the reaction tube and the limewater turns cloudy.

What is compound X?

- A calcium oxide
- B copper(II) oxide
- C magnesium oxide
- D sodium oxide

32 Water must be purified before it is suitable for use in the home.

Which processes are used to remove solid impurities and bacteria?

	to remove solid impurities	to remove bacteria
<b>A</b>	chlorination	chlorination
<b>B</b>	chlorination	filtration
<b>C</b>	filtration	chlorination
<b>D</b>	filtration	filtration

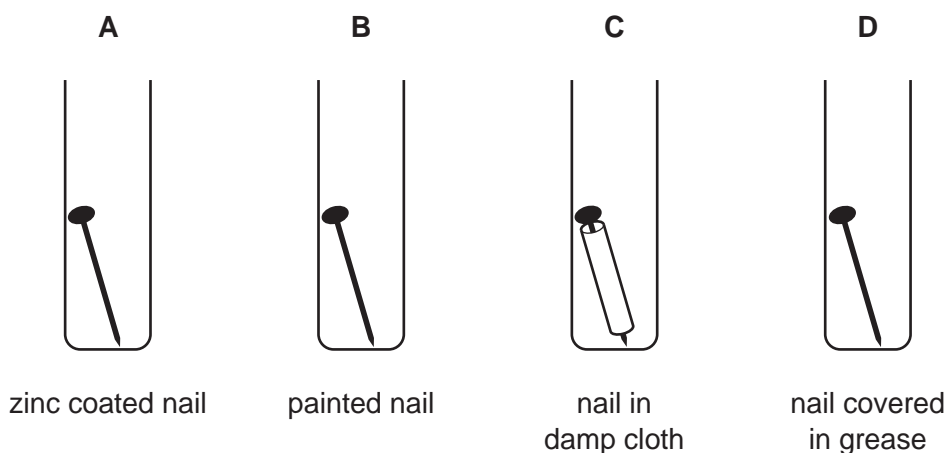
33 A newspaper article claims that carbon dioxide is formed as follows.

- 1 during respiration
- 2 when calcium carbonate reacts with hydrochloric acid
- 3 when methane burns in air

Which statements are correct?

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

34 Which iron nail rusts?

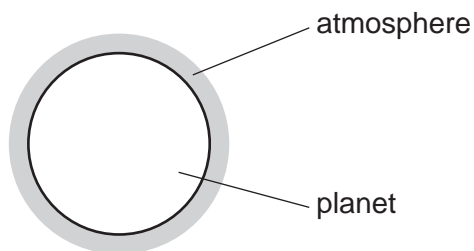


35 Fertilisers are used to provide three of the elements needed for plant growth.

Which two compounds would give a fertiliser containing all three of these elements?

- A  $\text{Ca}(\text{NO}_3)_2$  and  $(\text{NH}_4)_2\text{SO}_4$   
B  $\text{Ca}(\text{NO}_3)_2$  and  $(\text{NH}_4)_3\text{PO}_4$   
C  $\text{KNO}_3$  and  $(\text{NH}_4)_2\text{SO}_4$   
D  $\text{KNO}_3$  and  $(\text{NH}_4)_3\text{PO}_4$

36 A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of the atmosphere.

gas	percentage by volume
carbon dioxide	4
nitrogen	72
oxygen	24

Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

- A carbon dioxide and oxygen
- B carbon dioxide only
- C nitrogen and oxygen
- D nitrogen only

37 Butene and hexene belong to the same homologous series.

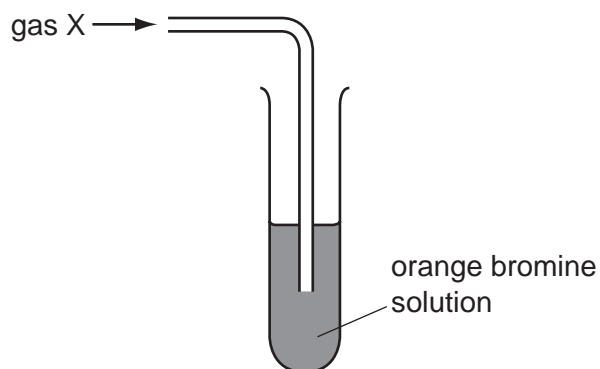
What is the same for butene and hexene?

- A boiling point
- B functional group
- C number of hydrogen atoms per molecule
- D relative molecular mass

38 Which statement about petroleum is **not** correct?

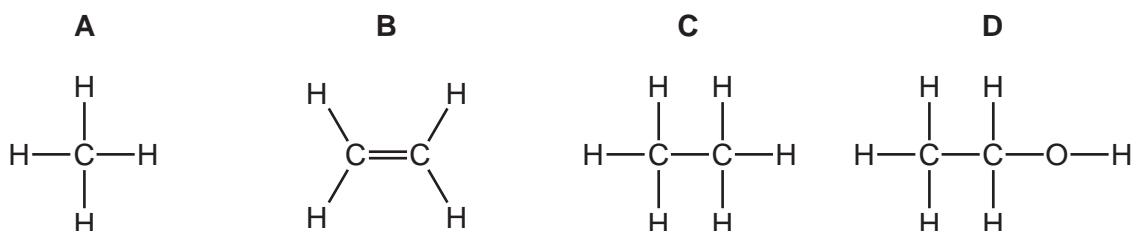
- A It can be separated into useful substances by fractional distillation.
- B It consists mainly of hydrocarbons.
- C It is found underground in many parts of the world.
- D Its main use is for making lubricants and polishes.

- 39 The apparatus shows an experiment used to test gas X.



The bromine solution quickly becomes colourless.

What is the structure of gas X?



- 40 The table shows the formulae of members of the alkane series.

name of compound	formula
methane	$\text{CH}_4$
ethane	$\text{C}_2\text{H}_6$
propane	?
butane	$\text{C}_4\text{H}_{10}$
pentane	$\text{C}_5\text{H}_{12}$

What is the formula of propane?

- A**  $\text{C}_2\text{H}_8$       **B**  $\text{C}_3\text{H}_7$       **C**  $\text{C}_3\text{H}_8$       **D**  $\text{C}_3\text{H}_9$

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																	
I	II	III	IV	V	VI	VII	0												
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10											
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18												
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36		
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	101 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54				
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium * 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	212 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86			
87 <b>Fr</b> Francium	226 <b>Ra</b> Radium	227 <b>Ac</b> Actinium																	

140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	
232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>Md</b> Mendelevium 101	238 <b>No</b> Nobelium 102	238 <b>Lr</b> Lawrencium 103

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

a	<b>X</b>
b	

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

Key

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