



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**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.



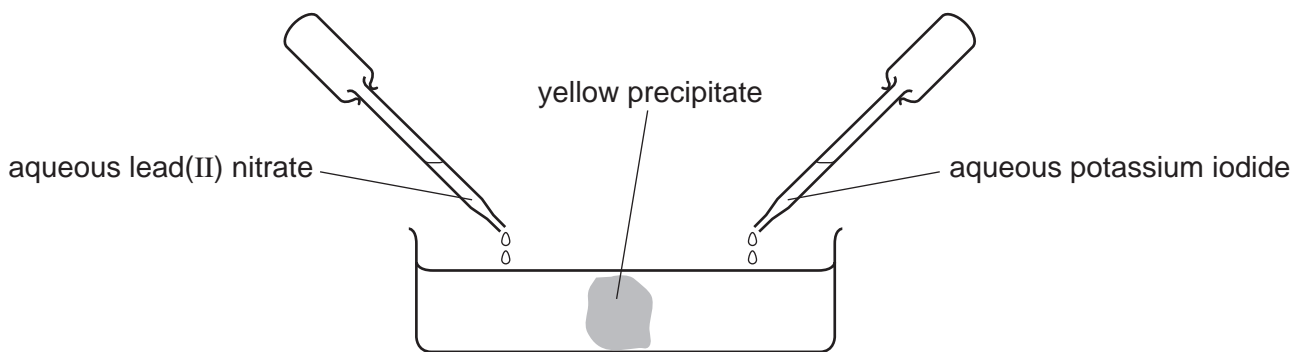
2

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.

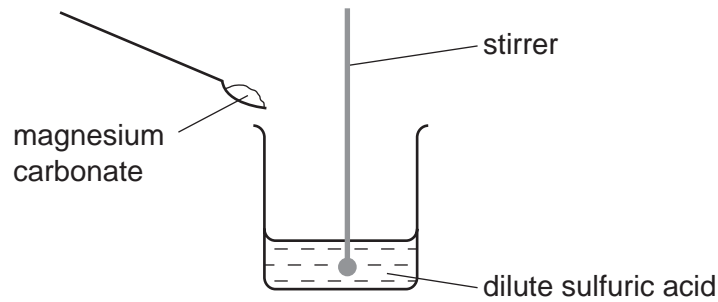
Which process occurs before the precipitate forms?

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

3

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

4

- 6 Covalent bonds are formed when electrons are .....1..... . Covalent compounds have low 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

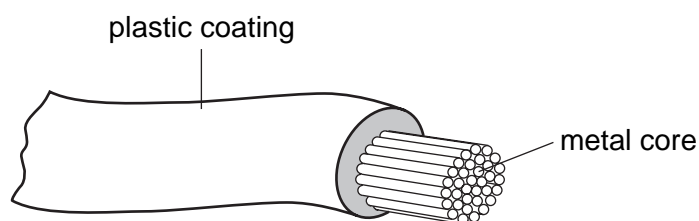
- 10 For each atom of carbon present in a molecule, there is an equal number of atoms of hydrogen and twice as many atoms of oxygen.

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?

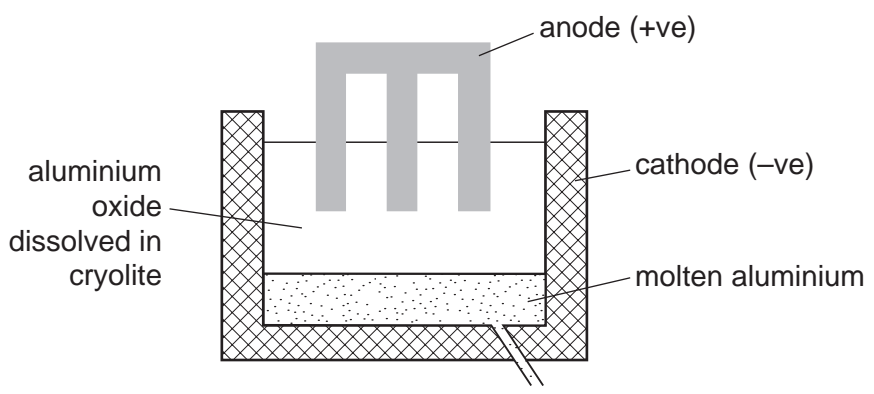
- A 12 g      B 16 g      C 96 g      D 144 g
- 12 The diagram shows an electrical cable.



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.

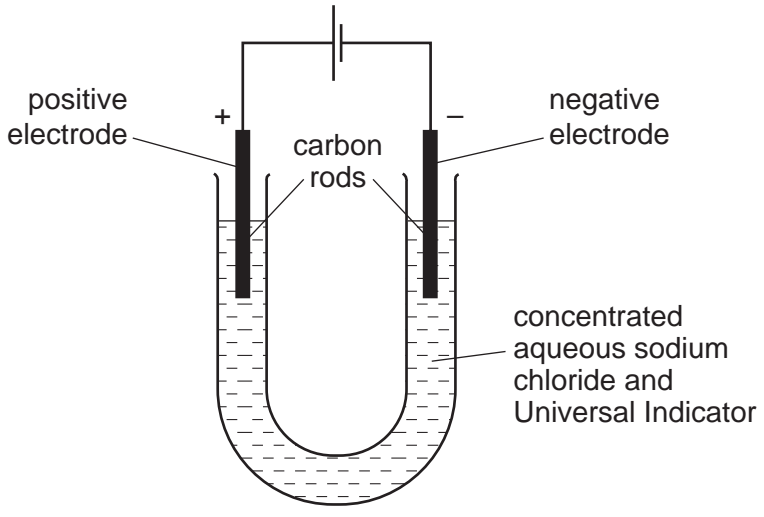
13 The diagram shows how aluminium is manufactured by electrolysis.



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>

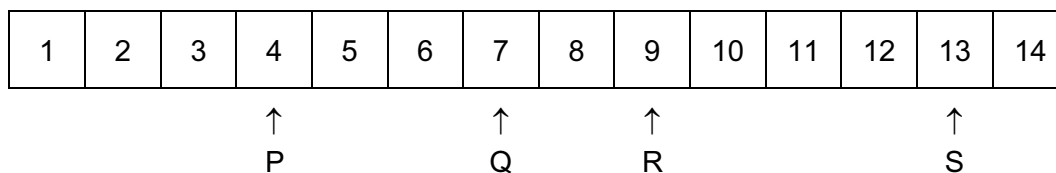
20 An aqueous solution Y contains both barium ions and silver ions.

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



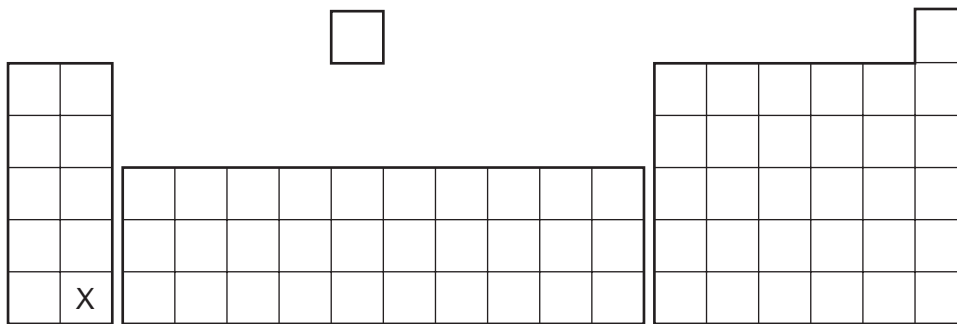
22 Salts can be prepared by reacting a dilute acid

- 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

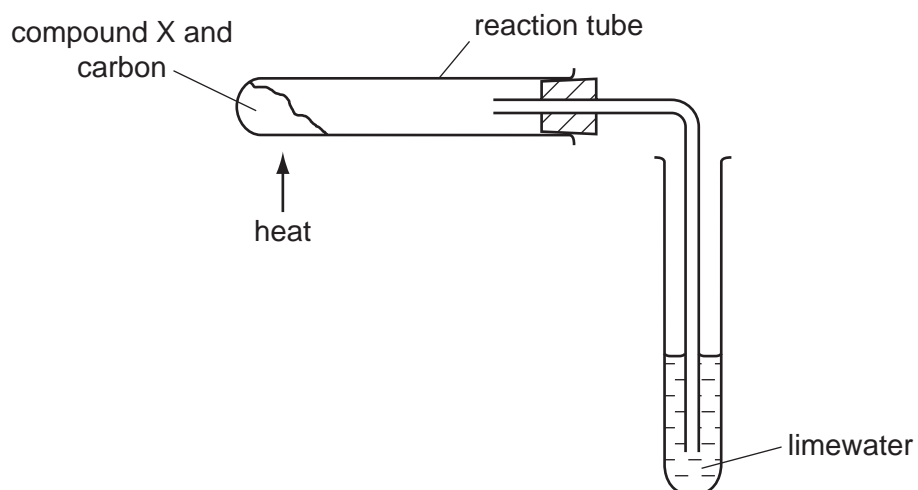
29 Which object is **least** likely to contain aluminium?

- 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
A	chlorination	chlorination
B	chlorination	filtration
C	filtration	chlorination
D	filtration	filtration

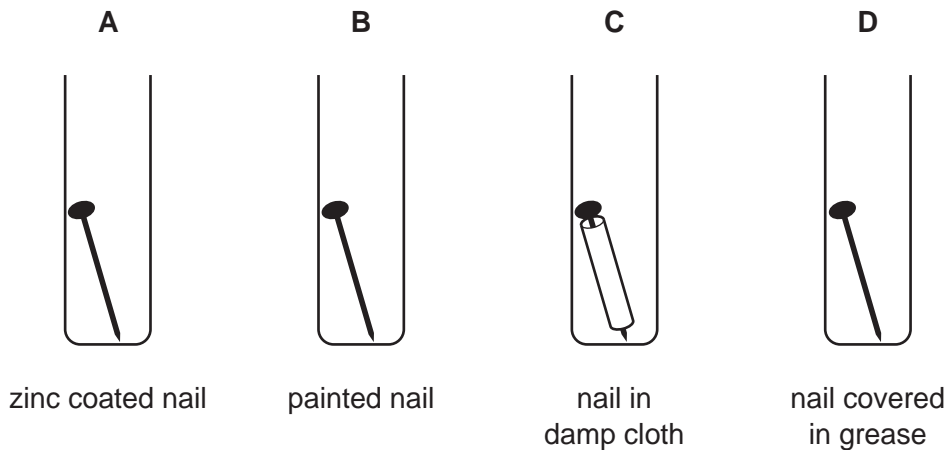
33 A newspaper article claims that carbon dioxide is formed as follows.

- 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?

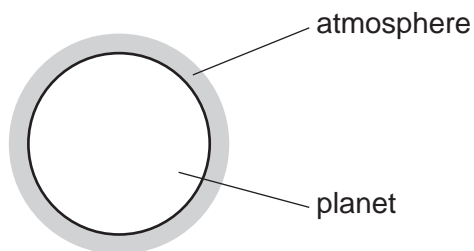


35 Fertilisers are used to provide three of the elements needed for plant growth.

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.

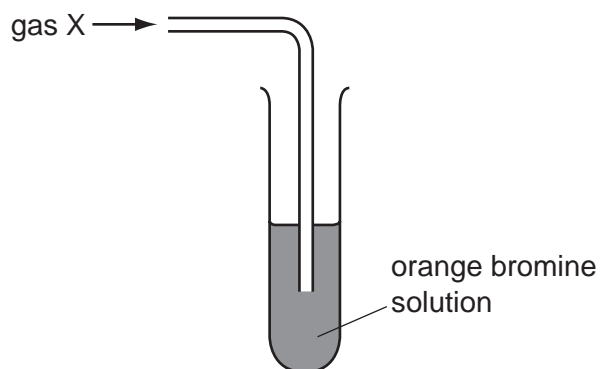
What is the same for butene and hexene?

- 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?

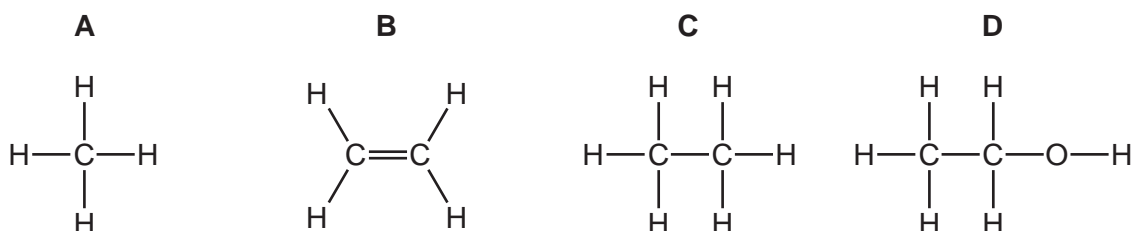
- A It can be separated into useful substances by fractional distillation.
- B It consists mainly of hydrocarbons.
- C It is found underground in many parts of the world.
- D Its main use is for making lubricants and polishes.

- 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																																	
	1 <b>H</b> Hydrogen 1																																								
7	9	24	11	12	14	16	19	20	27	28	31	32	35.5	40	54	84	131	175																							
3	4	12	5	6	7	8	9	10	13	14	15	16	17	18	36	54	86	103																							
Li Lithium	Be Beryllium	Mg Magnesium	B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon	Al Aluminium	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon	Kr Krypton	Xe Xenon	Rn Radon	Lu Lutetium																							
23	39	40	45	48	51	52	55	56	59	64	65	70	73	75	79	80	83	86	103																						
11	19	20	21	22	23	24	25	26	27	29	30	31	32	33	34	35	51	52	53																						
Na Sodium	K Potassium	Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	I Iodine	At Astatine	Lr Lawrencium																					
85	87	88	89	91	93	96	101	106	108	112	115	119	122	127	128	131	173	177	181	183																					
37	55	56	57	72	73	74	75	76	77	78	79	80	81	82	84	85	102	104	106	108																					
Rb Rubidium	Cs Caesium	Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	Po Polonium	Bi Bismuth	Tl Thallium	Pb Lead	Bi Bismuth																				
133	137	138	139	178	181	184	186	190	192	195	197	201	204	207	209	210	211	212	214	216	218																				
Fr Francium	Ra Radium	Ba Barium	La Lanthanum	Hf Hafnium	Ta Tantalum	W Tungsten	Re Rhenium	Os Osmium	Ir Iridium	Pt Platinum	Au Gold	Hg Mercury	Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon	Fr Francium	Ra Radium	Ac Actinium																				
87	88	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89																				
			* 58-71 Lanthanoid series			† 90-103 Actinoid series																																			
			a = relative atomic mass			X = atomic symbol			b = proton (atomic) number																																
			Key																																						
			140			141			144			150			152			157			159			162			165			167			169			173			175		
			Ce Cerium			Pr Praseodymium			Nd Neodymium			Sm Samarium			Eu Europium			Gd Gadolinium			Tb Terbium			Dy Dysprosium			Ho Holmium			Er Erbium			Tm Thulium			Yb Ytterbium			Lu Lutetium		
			58			59			60			62			63			64			65			66			67			68			69			70			71		
			232			238			244			250			254			258			262			266			270			274			278			282			286		
			Th Thorium			Pa Protactinium			U Uranium			Pu Plutonium			Am Americium			Cm Curium			Bk Berkelium			Cf Californium			Es Einsteinium			Fm Fermium			Md Mendelevium			No Nobelium			Lr Lawrencium		
			90			91			92			94			95			96			97			98			99			100			101			102			103		

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