

Second Variant Question Paper



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY**0620/12**

Paper 1 Multiple Choice

May/June 2009**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.

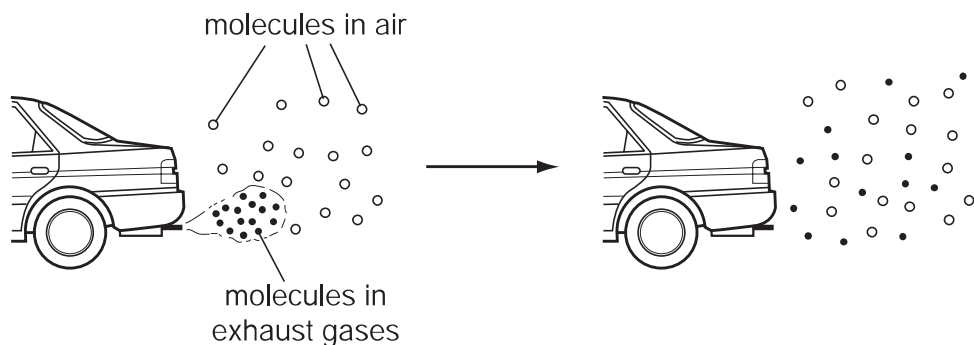
A copy of the Periodic Table is printed on page 16.

You may use a calculator.

This document consists of **15** printed pages and **1** blank page.
 * 6 9 6 2 6 4 8 2 4 3 *

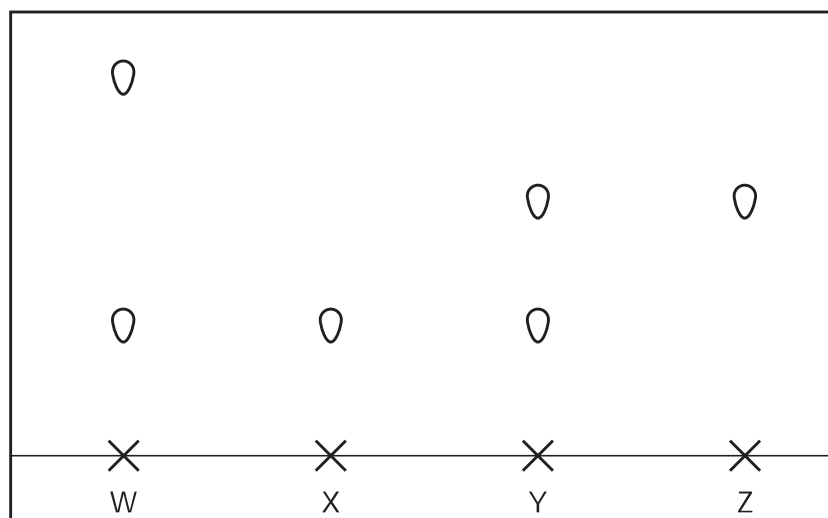
2

- 1 The diagram shows how the molecules in the exhaust gases diffuse into the air.



Which statement describes what happens to these molecules next?

- A The molecules fall to the ground because they are heavier than air molecules.
 - B The molecules go back together as they cool.
 - C The molecules spread further into the air.
 - D The molecules stay where they are.
- 2 The diagram shows the paper chromatograms of four substances, W, X, Y and Z.



Which two substances are pure?

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

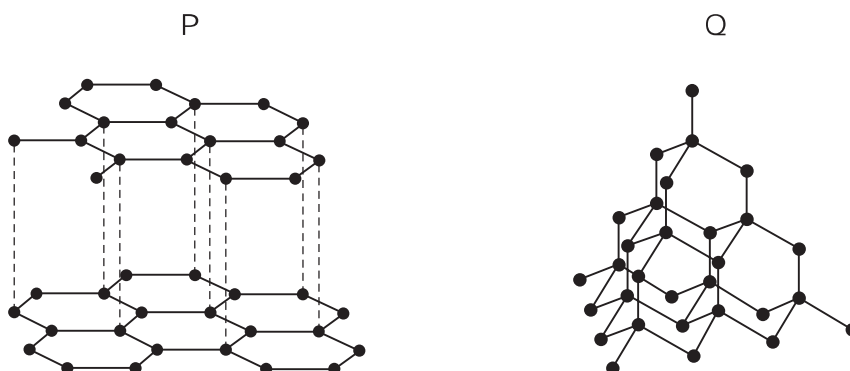
3

- 3 A student takes 2 g samples of calcium carbonate and adds them to 20 cm³ samples of dilute hydrochloric acid at different temperatures. She measures how long it takes for the effervescence to stop.

Which apparatus does she use?

	balance	clock	filter funnel	measuring cylinder	thermometer
A	✓	✓	✓	✓	✗
B	✓	✓	✗	✓	✓
C	✓	✗	✓	✓	✓
D	✗	✓	✓	✗	✓

- 4 The diagrams show the structures of two forms, P and Q, of a solid element.



What are suitable uses of P and Q, based on their structures?

	use of solid P	use of solid Q
A	drilling	drilling
B	drilling	lubricating
C	lubricating	drilling
D	lubricating	lubricating

- 5 An element S has the proton number 18. The next element in the Periodic Table is an element T.

Which statement is correct?

- A** Element T has one more electron in its outer shell than element S.
B Element T has one more electron shell than element S.
C Element T is in the same group of the Periodic Table as element S.
D Element T is in the same period of the Periodic Table as element S.

- 6 Element V 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 V?

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

- 7 Which numbers are added together to give the nucleon number of an ion?

- A number of electrons + number of neutrons
 B number of electrons + number of protons
 C number of electrons + number of protons + number of neutrons
 D number of protons + number of neutrons

- 8 When sodium chloride is formed from its elements, each chlorine atom1..... one2.....

Which words correctly complete gaps 1 and 2?

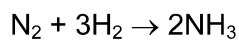
	1	2
A	gains	electron
B	gains	proton
C	loses	electron
D	loses	proton

- 9 The electronic configuration of an ion is 2.8.8.

What could this ion be?

	S ²⁻	Ca ²⁺
A	✓	✓
B	✓	x
C	x	✓
D	x	x

10 Nitrogen and hydrogen react together to form ammonia.



When completely converted, 7 tonnes of nitrogen gives 8.5 tonnes of ammonia.

How much nitrogen will be needed to produce 34 tonnes of ammonia?

- A** 7 tonnes **B** 8.5 tonnes **C** 28 tonnes **D** 34 tonnes

11 Which relative molecular mass, M_r , is **not** correct for the molecule given?

	molecule	M_r
A	ammonia, NH_3	17
B	carbon dioxide, CO_2	44
C	methane, CH_4	16
D	oxygen, O_2	16

12 Which of these elements could be formed at the anode when a molten salt is electrolysed?

- A** copper
B iodine
C lithium
D strontium

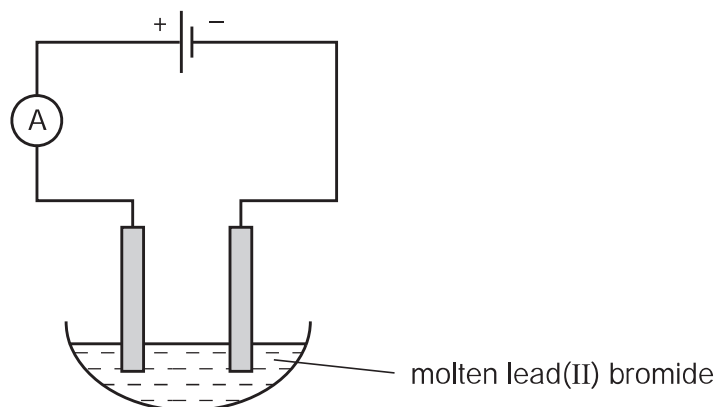
13 Aluminium is extracted from its oxide by electrolysis.

The oxide is dissolved in1..... cryolite and aluminium is deposited at the2.....

Which words correctly complete gaps 1 and 2?

	1	2
A	aqueous	cathode
B	aqueous	anode
C	molten	cathode
D	molten	anode

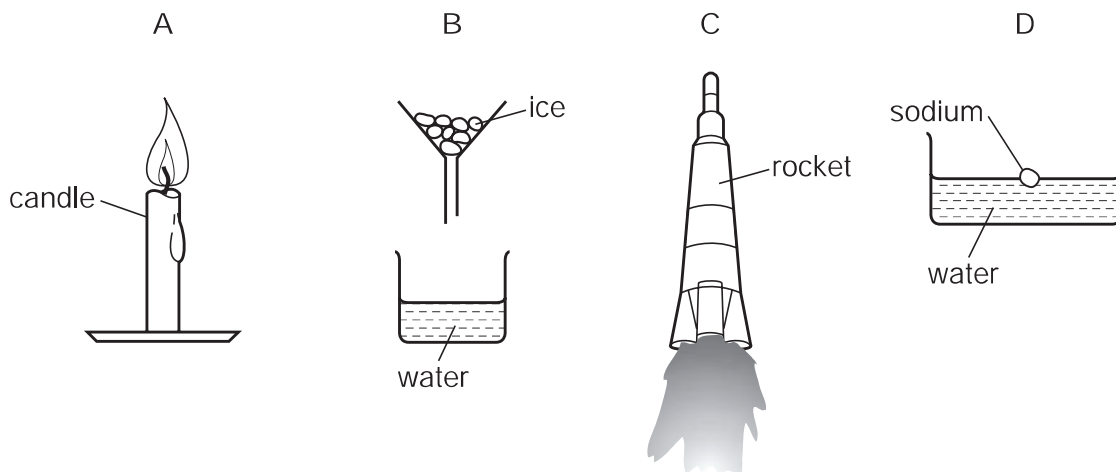
14 Molten lead(II) bromide is electrolysed as shown.



Which ions are discharged at each electrode?

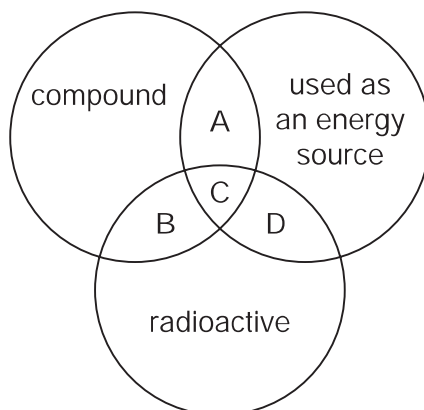
	positive electrode	negative electrode
A	Pb^+	Br^{2-}
B	Pb^{2+}	Br^-
C	Br^{2-}	Pb^+
D	Br^-	Pb^{2+}

15 Which diagram shows a process in which an endothermic change is taking place?



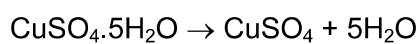
16 The diagram shows some properties that substances may have.

To which labelled part of the diagram does ^{235}U belong?



17 The equation shows a reaction that is reversed by changing the conditions.

forward reaction



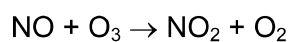
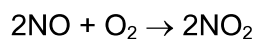
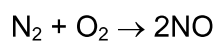
How can the forward reaction be reversed?

	by adding water	by heating
A	✓	✓
B	✓	x
C	x	✓
D	x	x

18 Which does **not** increase the speed of a reaction?

- A** adding a catalyst
- B** increasing the concentration of one of the reactants
- C** increasing the particle size of one of the reactants
- D** increasing the temperature

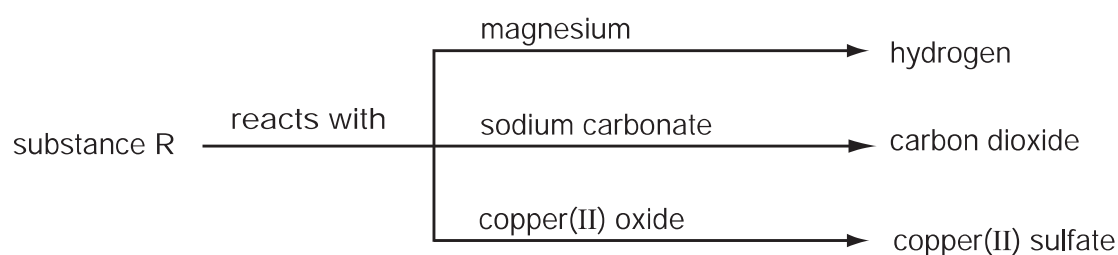
19 The reactions shown may occur in the air during a thunder storm.



Which line shows what happens to the reactant molecules in each of these reactions?

	N_2	NO	O_3
A	oxidised	oxidised	oxidised
B	oxidised	oxidised	reduced
C	reduced	reduced	oxidised
D	reduced	reduced	reduced

20 Some reactions of a substance, R, are shown in the diagram.



What type of substance is R?

- A** an acid
- B** a base
- C** an element
- D** a salt

21 An element E is burned in air. A white solid oxide is formed.

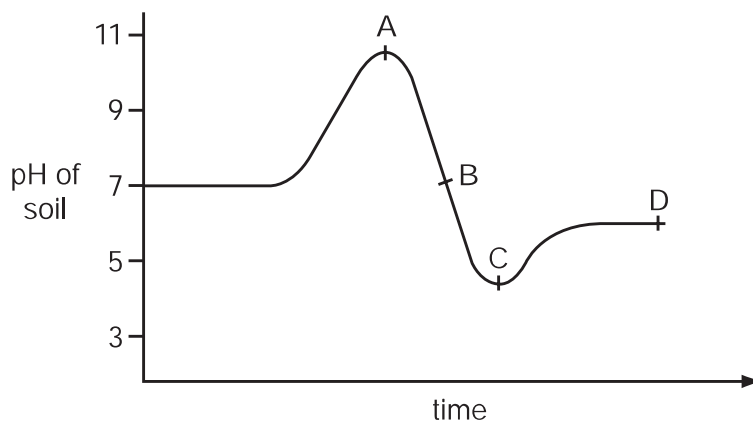
The oxide is tested with damp red litmus paper. The paper turns blue.

What is element E?

- A** calcium
- B** carbon
- C** iodine
- D** sulfur

22 The graph shows how the pH of soil in a field changed over time.

At which point was the soil neutral?



23 Aqueous sodium hydroxide is added to a solution of a salt. A blue precipitate is formed which does not dissolve in excess.

Aluminium foil is added to the mixture and the mixture is warmed. A gas is produced that turns damp red litmus paper blue.

What is the name of the salt?

- A ammonium nitrate
- B ammonium sulfate
- C copper(II) nitrate
- D copper(II) sulfate

24 Which statement describes the trends going down group VII of the Periodic Table?

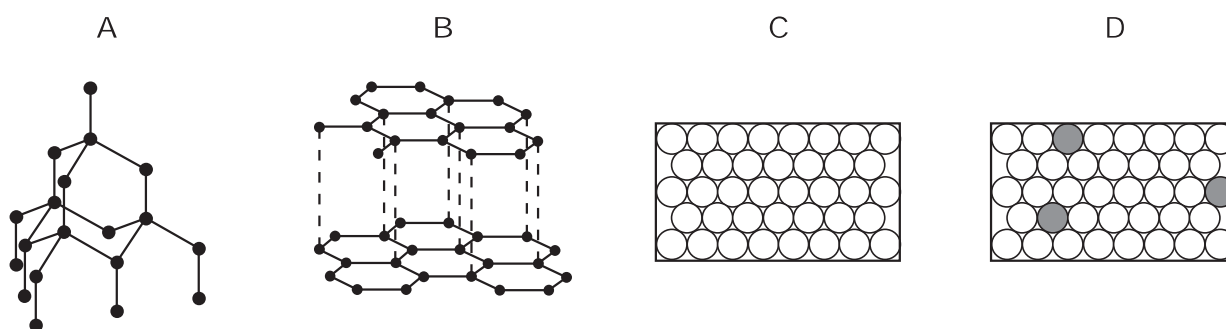
- A The boiling point and melting point both decrease.
- B The boiling point and melting point both increase.
- C The boiling point decreases but the melting point increases.
- D The boiling point increases but the melting point decreases.

25 The sulfate of element F is green.

Which other properties is element F likely to have?

	density	melting point
A	high	high
B	high	low
C	low	high
D	low	low

26 Which diagram represents the structure of an alloy?

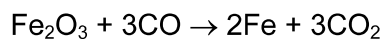


27 An inert atmosphere is needed in a lamp to lengthen the useful life of the metal filament.

Why is argon, rather than helium, used for this purpose?

	argon is more abundant in the air	argon is less dense than helium
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

28 In a blast furnace, iron(III) oxide is converted to iron and carbon monoxide is converted to carbon dioxide.



What happens to each of these reactants?

- A** Both iron(III) oxide and carbon monoxide are oxidised.
- B** Both iron(III) oxide and carbon monoxide are reduced.
- C** Iron(III) oxide is oxidised and carbon monoxide is reduced.
- D** Iron(III) oxide is reduced and carbon monoxide is oxidised.

29 Which property do all metals have?

- A They are hard.
- B They conduct electricity.
- C They form acidic oxides.
- D They react with water.

30 Stainless steel is an alloy of iron and other metals. It is strong and does not rust but it costs much more than normal steel.

What is **not** made from stainless steel?

- A cutlery
- B pipes in a chemical factory
- C railway lines
- D saucepans

31 The table gives information about three different metals G, H and J.

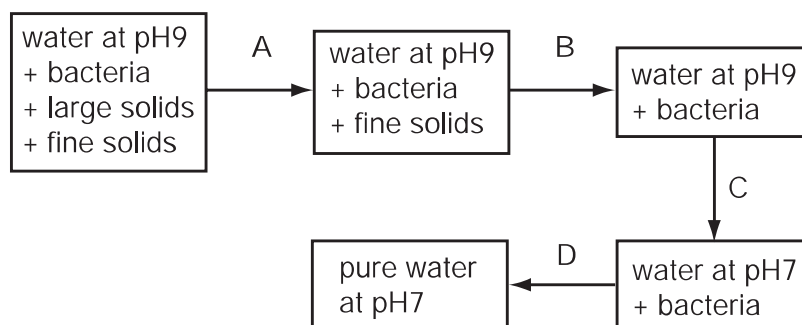
metal	does it react with		key
	water	steam	
G	x	x	✓ = does react
H	✓	✓	x = does not react
J	x	✓	

What is the order of reactivity of these metals?

	most reactive	→	least reactive
A	G		J
B	H		J
C	H		G
D	J		G

32 The diagram shows stages in the purification of water.

Which stage uses chlorine?



33 Which statements are correct?

- 1 Carbon monoxide is responsible for the production of 'acid rain'.
- 2 Oxides of nitrogen are present in car exhausts.
- 3 Sulfur dioxide can be produced by the combustion of fossil fuels.

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

34 Substance K reacts with sodium carbonate to form a gas.

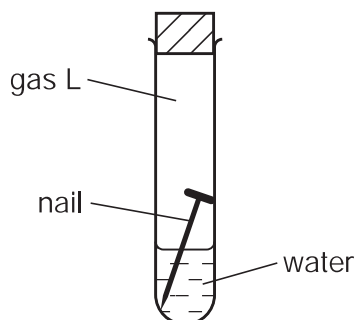
The gas turns limewater cloudy.

What is substance K and which process takes place in the reaction?

	K	process
A	ethanol	combustion
B	ethanol	neutralisation
C	hydrochloric acid	combustion
D	hydrochloric acid	neutralisation

35 An iron nail is placed in a closed test-tube, containing gas L.

The nail rusts.



What is gas L?

- A carbon dioxide
- B hydrogen
- C nitrogen
- D oxygen

36 A compound has the formula $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$.

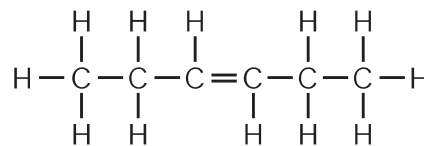
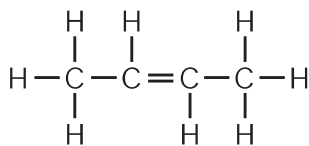
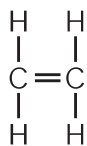
Which row in the table shows the type of compound and the colour change when aqueous bromine is added?

	type of compound	colour change
A	saturated	brown to colourless
B	saturated	colourless to brown
C	unsaturated	brown to colourless
D	unsaturated	colourless to brown

37 Which element is **not** added to a fertiliser?

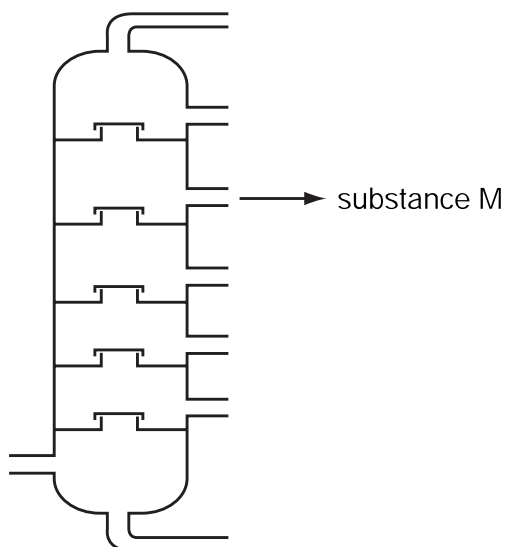
- A aluminium
- B nitrogen
- C phosphorus
- D potassium

38 The structures of three compounds are shown.



Why do these substances all belong to the same homologous series?

- A They all contain an even number of carbon atoms.
 B They all contain the same functional group.
 C They are all hydrocarbons.
 D They are all saturated.
- 39 Which bond is **not** in a molecule of ethanoic acid?
 A C–O B C=O C C=C D O–H
- 40 The diagram shows an industrial process. Substance M is one of the substances produced by this process and is used as aircraft fuel.



What is this process and what is substance M?

	process	substance M
A	fractional distillation	paraffin
B	fractional distillation	petrol
C	thermal decomposition	paraffin
D	thermal decomposition	petrol

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DATA SHEET
The Periodic Table of the Elements

		Group																																														
I	II	III	IV	V	VI	VII	0					0																																				
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	11 B Boron 5	13 Al Aluminium 13	15 P Phosphorus 15	17 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18																																			
23 Na Sodium 11	24 Mg Magnesium 12	27 Fe Iron 26	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	56 Fe Iron 26	59 Co Cobalt 27	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																															
39 K Potassium 19	40 Ca Calcium 20	55 Mn Manganese 25	52 Cr Chromium 24	59 Co Cobalt 27	56 Fe Iron 26	64 Cu Copper 29	65 Zn Zinc 30	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	127 I Iodine 53	131 Xe Xenon 54	137 Cs Caesium 55	138 Ba Barium 56	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	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86														
87 Fr Francium	88 Ra Radium	89 Ac Actinium	89 Y Yttrium	89 La Lanthanum	89 Ce Cerium	89 Pr Praseodymium	89 Nd Neodymium	89 Pm Promethium	89 Sm Samarium	89 Eu Europium	89 Gd Gadolinium	89 Tb Terbium	89 Dy Dysprosium	89 Ho Holmium	89 Er Erbium	89 Tm Thulium	89 Yb Ytterbium	89 Lu Lutetium	89 La Lanthanum	89 Ce Cerium	89 Pr Praseodymium	89 Nd Neodymium	89 Pm Promethium	89 Sm Samarium	89 Eu Europium	89 Gd Gadolinium	89 Tb Terbium	89 Dy Dysprosium	89 Ho Holmium	89 Er Erbium	89 Tm Thulium	89 Yb Ytterbium	89 Lu Lutetium	89 La Lanthanum	89 Ce Cerium	89 Pr Praseodymium	89 Nd Neodymium	89 Pm Promethium	89 Sm Samarium	89 Eu Europium	89 Gd Gadolinium	89 Tb Terbium	89 Dy Dysprosium	89 Ho Holmium	89 Er Erbium	89 Tm Thulium	89 Yb Ytterbium	89 Lu Lutetium

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

Key

a	X	a = relative atomic mass
b	X	X = atomic symbol
	b	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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