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Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **May/June 2014**

1 hour

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

* 4 9 7 6 8 3 1 4 9 3 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, 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.
DO **NOT** WRITE IN ANY BARCODES.

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.
Electronic calculators may be used.

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1 Which process is suitable for obtaining the water from an aqueous solution of sugar?

A crystallisation

B distillation

C filtration

D use of a separating funnel

2 Sulfur dioxide and oxygen react together.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) \quad \Delta H = -197\,kJ/mol$$

Which change(s) will increase both the rate of reaction and the equilibrium concentration of SO_3?

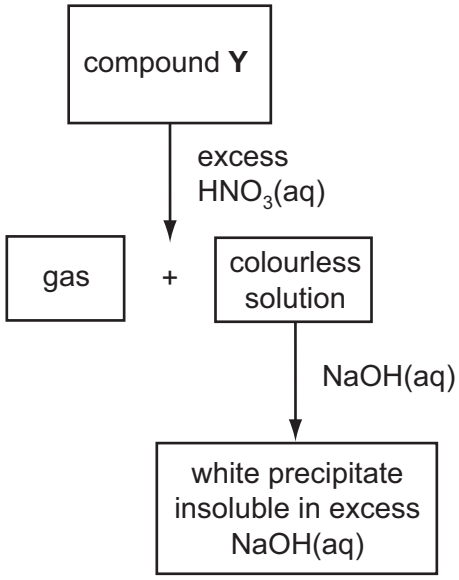
1 adding a catalyst

2 increasing temperature

3 increasing pressure

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

3 The scheme shows a sequence of reactions starting from compound **Y**.



What could the compound **Y** be?

A aluminium sulfate

B calcium carbonate

C copper(II) carbonate

D zinc carbonate

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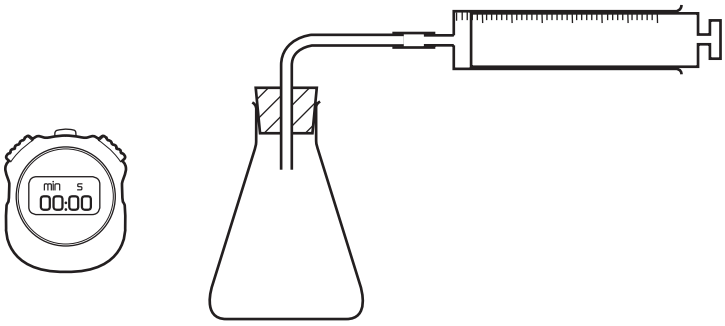
4 The apparatus shown can be used to find the rate of some chemical reactions.



The rate of which reaction can be followed using this apparatus?

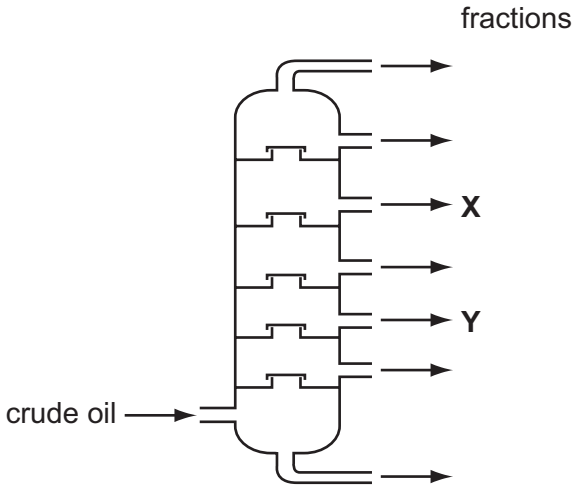
A $AgNO_3$ + KI

B Mg + HC*l*

C NaOH + $CuSO_4$

D NaOH + HC*l*

5 Crude oil is fractionally distilled in a fractionating column. The positions at which fractions **X** and **Y** are collected are shown.



Which statement is correct?

A The temperature increases up the column.

B **X** condenses at a lower temperature than **Y**.

C **X** has a higher boiling point than **Y**.

D **X** has longer chain molecules than **Y**.

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6 An ion X^+ has 23 nucleons and 10 electrons.

What does the nucleus of *X* contain?

	protons	neutrons
A	9	14
B	10	13
C	11	12
D	13	10

7 Which element exists as a macromolecule?

A carbon

B hydrogen

C oxygen

D sodium

8 Which substance can conduct electricity by the movement of ions?

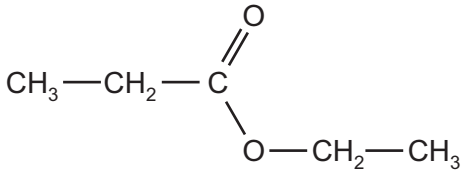
A copper

B graphite

C mercury

D sodium chloride

9 The diagram shows the molecule ethyl propanoate.



Consider **all** the electrons in a molecule of ethyl propanoate.

How many electrons **not** involved in bonding are there in the molecule?

A 8 **B** 10 **C** 18 **D** 22

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10 Sodium and magnesium are next to each other in the Periodic Table.

	melting point / °C	boiling point / °C
Na	98	883
Mg	649	1103

Which statement explains the differences in the melting and boiling points of these elements?

A Na and Mg have different types of bonding.

B The electrostatic forces of attraction are stronger in Mg.

C The ionic bonds in Mg are stronger than those in Na.

D The Mg atoms are larger than the Na atoms.

11 Sulfuric acid and potassium hydroxide can react together to form potassium hydrogensulfate, $KHSO_4$, and water only.

Which amounts of the reactants are required?

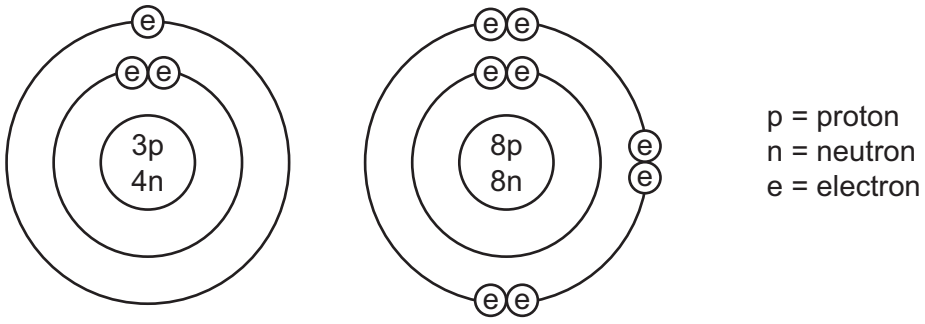
A equal masses of sulfuric acid and potassium hydroxide

B equal numbers of moles of sulfuric acid and potassium hydroxide

C 1 mol of sulfuric acid to 2 mol of potassium hydroxide

D 2 mol of sulfuric acid to 1 mol of potassium hydroxide

12 The diagram shows the structures of the atoms of elements *L* and *M*.



L *M*

The elements combine to form a compound.

What is the mass of one mole of this compound?

A 11 g **B** 12 g **C** 23 g **D** 30 g

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13 A concentrated aqueous solution of sodium chloride is electrolysed.

What are the equations for the reactions taking place at the cathode (negative electrode) and the anode (positive electrode)?

	cathode (–ve)	anode (+ve)
A	$2H^+ + 2e^- \rightarrow H_2$	$2Cl^- \rightarrow Cl_2 + 2e^-$
B	$2H^+ + 2e^- \rightarrow H_2$	$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$
C	$Na^+ + e^- \rightarrow Na$	$2Cl^- \rightarrow Cl_2 + 2e^-$
D	$Na^+ + e^- \rightarrow Na$	$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$

14 What is observed during the electrolysis of aqueous copper(II) sulfate using carbon electrodes?

A A pink solid is deposited on the anode.

B Bubbles form on the negative electrode.

C The colour of the solution fades.

D The negative electrode becomes smaller.

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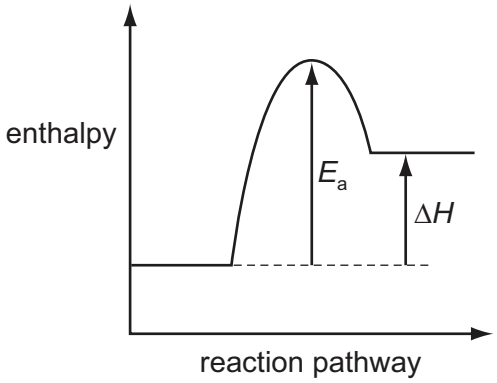
15 Nitrogen monoxide is an atmospheric pollutant that is formed in car engines by the reaction between nitrogen and oxygen.

$$N_2(g) + O_2(g) \rightarrow 2NO(g) \qquad \Delta H = +66\,kJ/mol$$

Which diagram represents the energy profile for this reaction?

A



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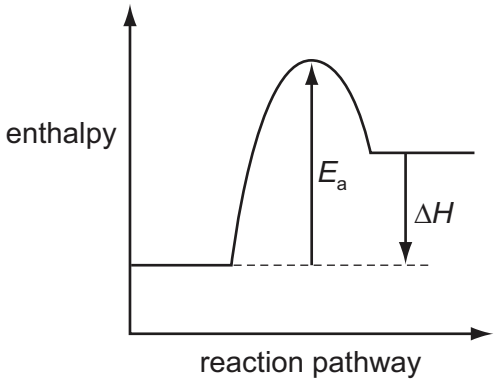

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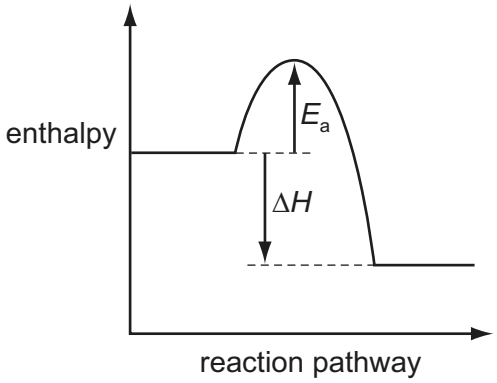
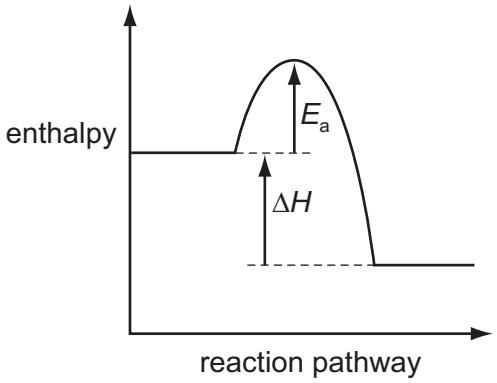


D



16 Which substance does **not** react with hydrochloric acid?

A zinc carbonate

B zinc hydroxide

C zinc metal

D zinc nitrate

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17 The table shows the energy released by the complete combustion of some compounds used as fuels.

compound	formula	M_r	ΔH in kJ / mol
benzene	C_6H_6	78	–3270
heptane	C_7H_{16}	100	–4800
octane	C_8H_{18}	114	–5510
propane	C_3H_8	44	–2200

Which fuel releases the least energy when 1 g of the compound is completely burned?

A benzene

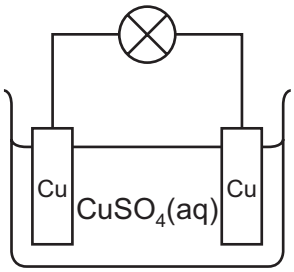
B heptane

C octane

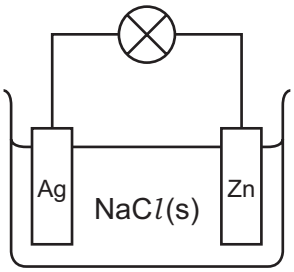
D propane

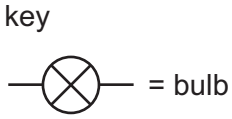
18 In which circuit does the bulb light?

A



B





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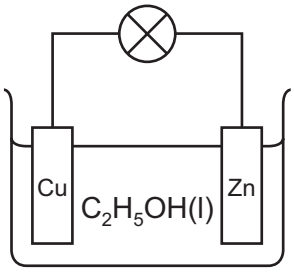

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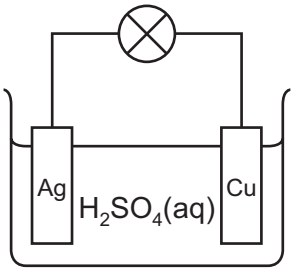

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19 Ammonia is made by a reversible reaction between nitrogen and hydrogen.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) \qquad \Delta H = -92\,kJ/mol$$

What is the effect of increasing the pressure in this process?

A Less heat is produced.

B More ammonia is formed.

C More nitrogen is present at equilibrium.

D The reaction slows down.

20 Which change involves reduction?

A calcium carbonate to calcium oxide

B copper to brass

C ethene to poly(ethene)

D sand to silicon

21 Samples of three oxides, **X**, **Y** and **Z**, were added separately to dilute hydrochloric acid and to dilute sodium hydroxide.

X and **Y** react with dilute hydrochloric acid but **Z** does not react.

Y and **Z** react with aqueous sodium hydroxide but **X** does not react.

Which type of oxide are each of **X**, **Y** and **Z**?

	type of oxide		
	acidic	amphoteric	basic
A	**X**	**Y**	**Z**
B	**Y**	**X**	**Z**
C	**Z**	**X**	**Y**
D	**Z**	**Y**	**X**

22 Which process does **not** involve the use of a transition element?

A the manufacture of margarine from vegetable oil

B the manufacture of sulfuric acid in the Contact process

C the purification of river water to produce drinking water

D the removal of combustion pollutants from car exhaust gases

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23 Element *Q* is in Period 3 of the Periodic Table. It can form ions with the formula Q^{3-}.

Which element is most likely to be *Q*?

A aluminium

B arsenic

C phosphorus

D sulfur

24 Which property would all the hydrogen compounds of the Group VII elements possess?

A be covalent

B be solids at room temperature

C form alkaline aqueous solutions

D conduct electricity when molten

25 A student mixed together aqueous solutions of **Y** and **Z**. A white precipitate formed.

Which could **not** be **Y** and **Z**?

	Y	**Z**
A	hydrochloric acid	silver nitrate
B	hydrochloric acid	sodium nitrate
C	sodium chloride	lead(II) nitrate
D	sodium chloride	silver nitrate

26 Aluminium is extracted from its molten oxide ore by electrolysis whereas zinc is extracted by reduction of its oxide when heated with coke.

Which statement explains this?

A Aluminium is very high in the reactivity series.

B Aluminium ores are very rare.

C Electrolysis is a cheaper method than reduction of the oxide with coke.

D Zinc oxide has a higher melting point than aluminium oxide.

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27 In which solid can layers of atoms slide over each other?

A diamond

B graphite

C haematite

D silica

28 Which ion causes the acidity in dilute hydrochloric acid?

A Cl^- **B** H^+ **C** H_2^+ **D** OH^-

29 Which metal can react rapidly with steam but reacts only **very slowly** with cold water?

A calcium

B copper

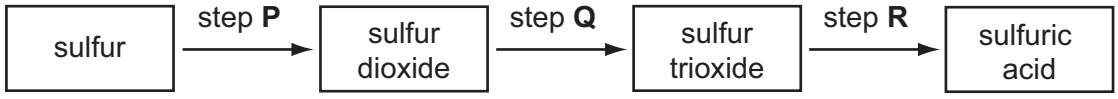
C iron

D potassium

30 Which gas turns moist blue litmus paper red and produces a precipitate when bubbled through calcium hydroxide solution?

A CO **B** CO_2 **C** HCl **D** NH_3

31 The diagram shows three steps in the manufacture of sulfuric acid.



In which steps is a catalyst used?

A step **Q** only

B step **R** only

C steps **Q** and **R** only

D steps **P** and **Q** and **R**

32 Which property of compounds in a homologous series is correct?

A They all have the same general formula.

B They all have the same molecular formula.

C They all have the same number of isomers.

D They all have the same physical properties.

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33 Which compound, on combustion, **never** forms carbon?

A carbon monoxide

B ethanol

C ethene

D methane

34 Which process is an example of cracking?

A $C_2H_4 + H_2O \rightarrow C_2H_5OH$

B $C_3H_6 + H_2 \rightarrow C_3H_8$

C $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

D $C_4H_{10} \rightarrow C_2H_4 + C_2H_6$

35 A hydride is a compound containing **only** two elements, one of which is hydrogen.

Which element can form the greatest number of different hydrides?

A carbon

B chlorine

C nitrogen

D oxygen

36 A liquid reacts with each of sodium carbonate, potassium hydroxide and ethanol.

What is the liquid?

A aqueous ammonia

B ethanoic acid

C ethyl ethanoate

D sodium hydroxide

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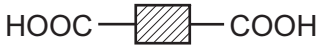
37 Compound **X** and compound **Y** combine to form a polymer.



compound **X**

compound **Y**

Which of the statements about the polymer and its formation is **not** correct?

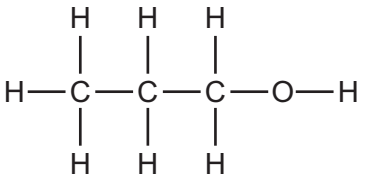
A Ammonia is formed during the production of the polymer.

B Hydrolysis of the polymer produces **X** and **Y**.

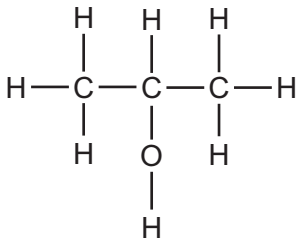
C The polymer is a polyamide.

D The polymer is formed by a condensation reaction.

38 The structural formulae of some organic compounds are shown below.



1



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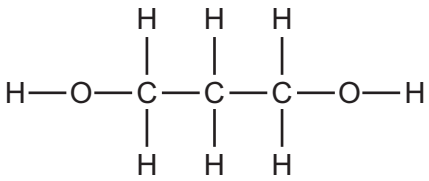

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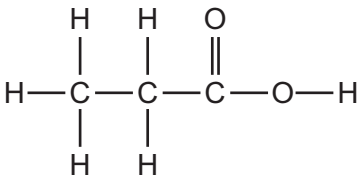

4

Which compounds are alcohols?

A 1 only

B 1 and 2 only

C 1, 2 and 3

D 4

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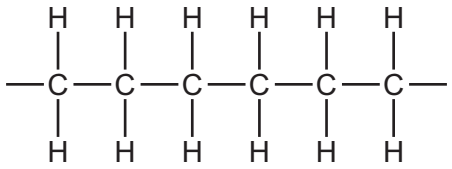
39 What is the partial structure of the polymer formed by the polymerisation of propene, $CH_3CH=CH_2$?

A



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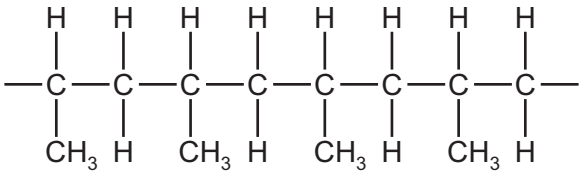

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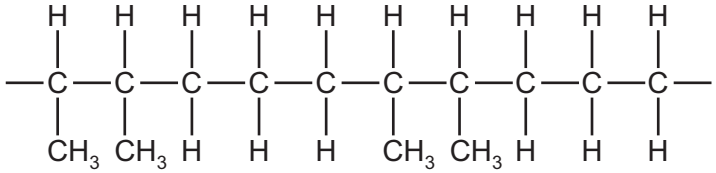

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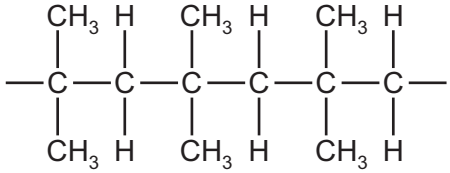

40 When a volcano erupts, which gas is produced in significant amounts?

A carbon monoxide

B methane

C ozone

D sulfur dioxide

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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** Sulfur 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	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	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	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	a = relative atomic mass
X	**X** = atomic symbol
b	b = proton (atomic) number

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

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