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)

4976831493

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.

IB14 06_5070_12/5RP

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?

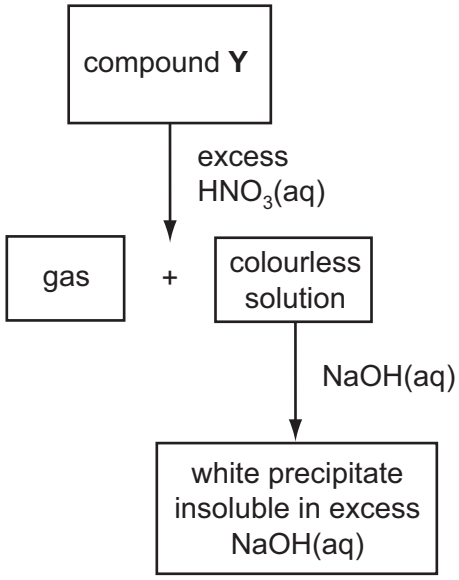
1 adding a catalyst

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?

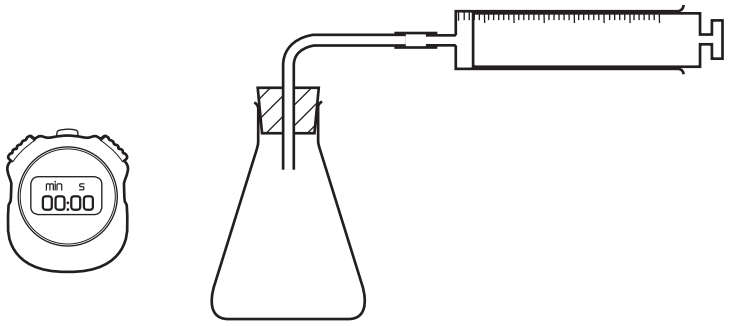
A aluminium sulfate

B calcium carbonate

C copper(II) carbonate

D zinc carbonate

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?

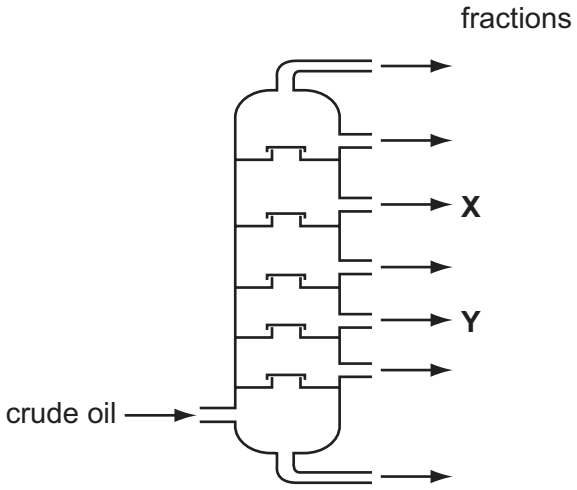
A $AgNO_3$ + KI

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**.

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?

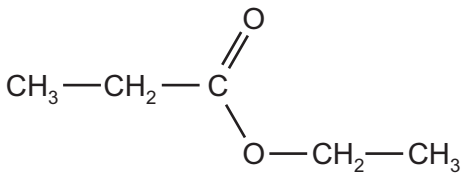
A copper

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

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?

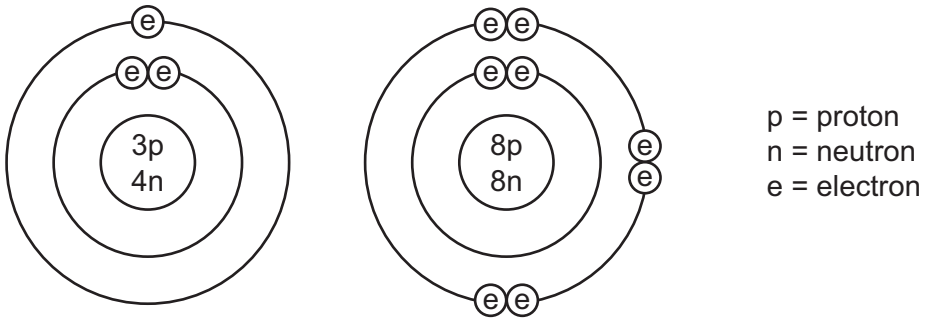
A equal masses of sulfuric acid and potassium hydroxide

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

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.

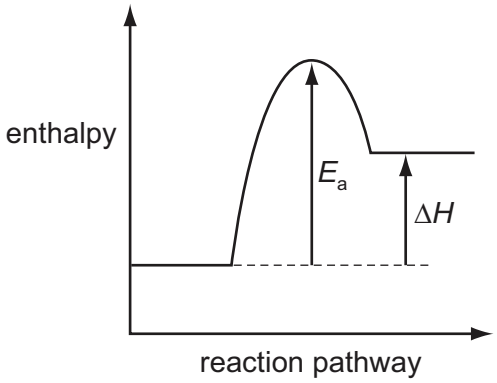
D The negative electrode becomes smaller.

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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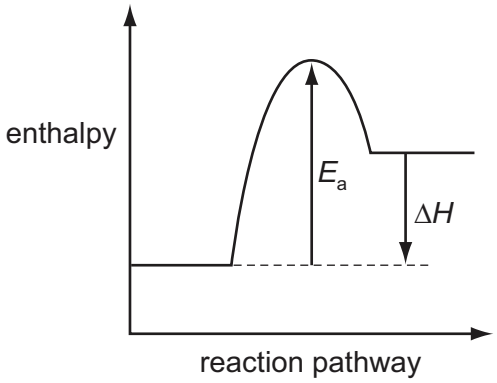

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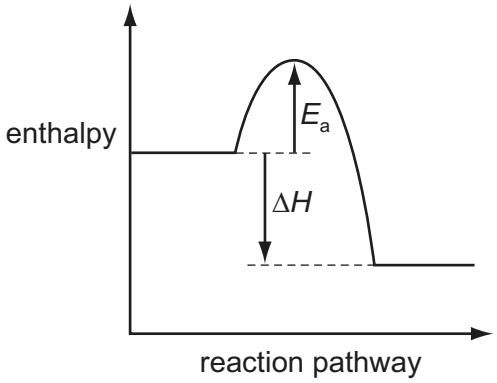

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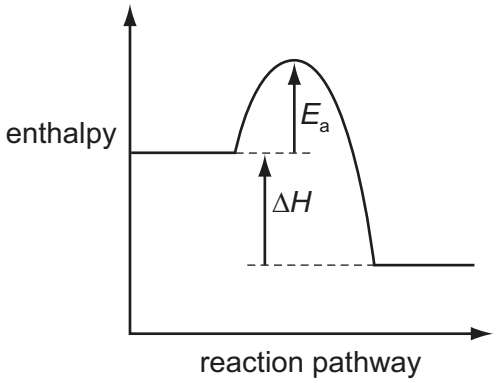


16 Which substance does **not** react with hydrochloric acid?

A zinc carbonate

B zinc hydroxide

C zinc metal

D zinc nitrate

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

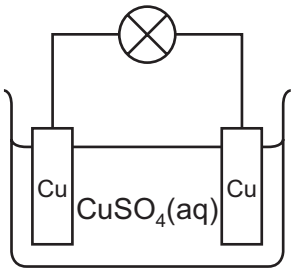
B heptane

C octane

D propane

18 In which circuit does the bulb light?

A



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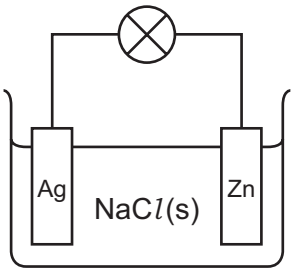
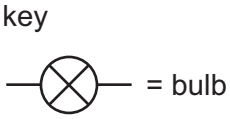
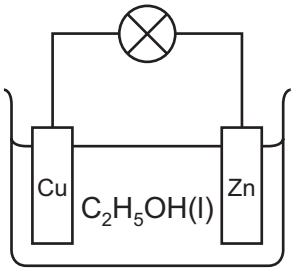




C



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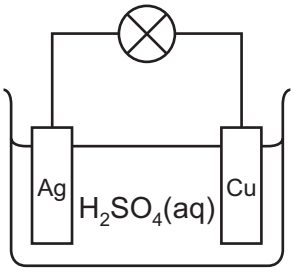


19 Ammonia is made by a reversible reaction between nitrogen and hydrogen.

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

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

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.

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

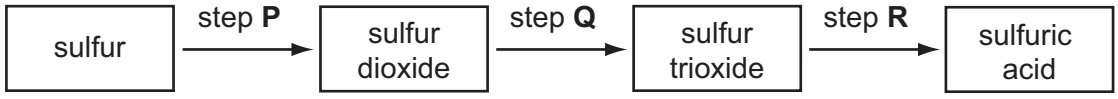
C iron

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.

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?

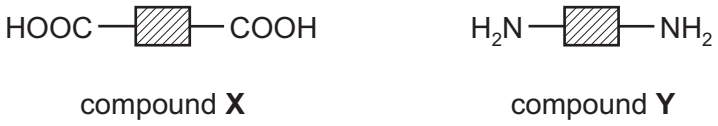
A aqueous ammonia

B ethanoic acid

C ethyl ethanoate

D sodium hydroxide

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?

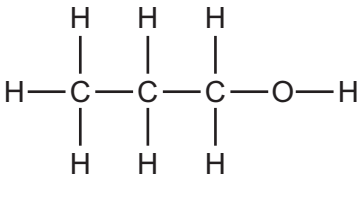
A Ammonia is formed during the production of the polymer.

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.



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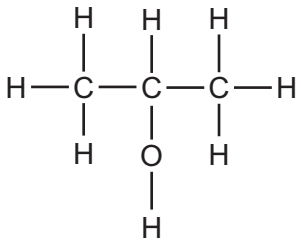

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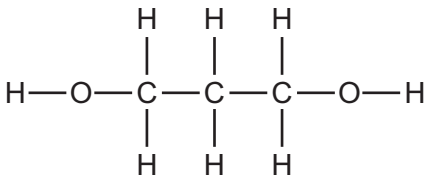

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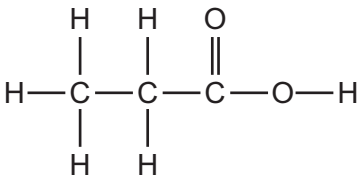


4

Which compounds are alcohols?

A 1 only

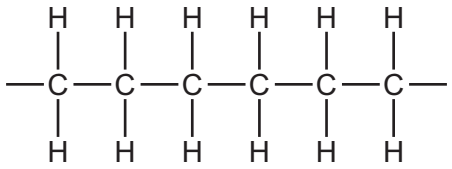
B 1 and 2 only

C 1, 2 and 3

D 4

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

A



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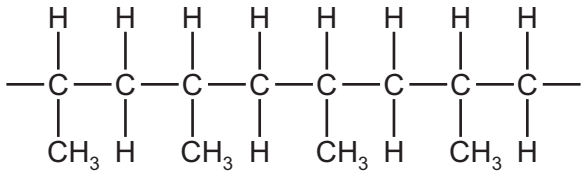

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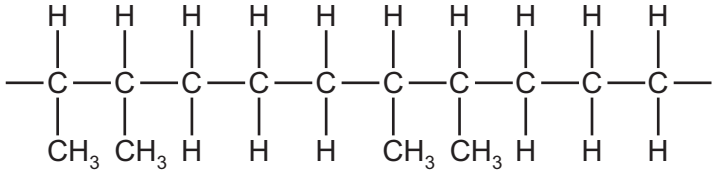

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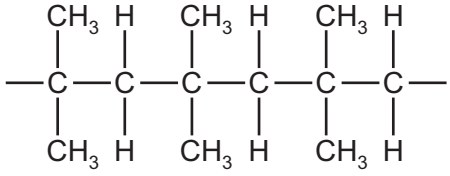

40 When a volcano erupts, which gas is produced in significant amounts?

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	73 Ge Germanium 32	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	119 Sn Tin 50	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 = relative atomic mass; X = atomic symbol; b = proton (atomic) number

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