Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **May/June 2015**

1 hour

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

* 3 2 8 4 3 9 0 6 8 6 *

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.

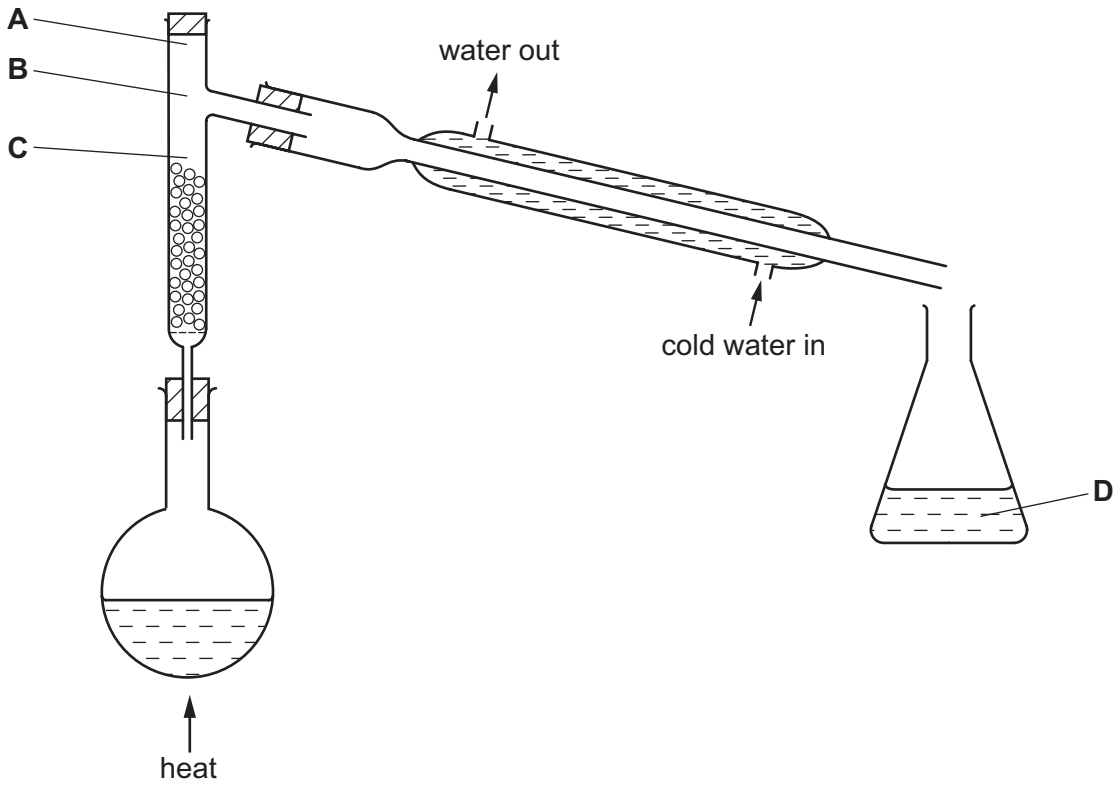
Read the instructions on the Answer Sheet very carefully.

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 The fractional distillation apparatus shown is being used to separate a mixture of two liquids. A thermometer is missing from the apparatus.

Where should the bulb of the thermometer be placed?



2 The concentration of aqueous sodium carbonate can be found by reaction with hydrochloric acid of known concentration using the indicator methyl orange.

Which items of equipment are needed?

A burette, measuring cylinder, gas syringe

B burette, measuring cylinder, thermometer

C burette, pipette, conical flask

D burette, pipette, stopwatch

3 Which molecules all contain one or more double covalent bonds?

A chlorine, nitrogen and methane

B chlorine, oxygen and ethene

C oxygen, hydrogen chloride and ethene

D oxygen, carbon dioxide and ethene

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4 The metals Cr, Co, Fe and Mn are all transition elements.

Which particles have the same number of electrons?

A Co^{2+} and Cr

B Co^{2+} and Fe^{3+}

C Cr and Mn^{2+}

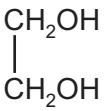
D Fe^{3+} and Mn^{2+}

5 Which substance has metallic bonding?

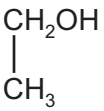
	conducts electricity		state of product formed on reaction with oxygen
	when solid	when liquid	
A	✓	✓	solid
B	✓	✓	gas
C	✗	✓	no reaction
D	✗	✗	solid

6 Which compound contains only eight covalent bonds?

A



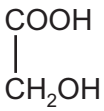
B



C



D



7 The table shows the results of two reactions of an aqueous solution of a salt.

reagents	final observation
excess aqueous sodium hydroxide	white precipitate
dilute nitric acid and aqueous silver nitrate	white precipitate

What could be the identity of the salt?

A calcium chloride

B calcium iodide

C zinc chloride

D zinc iodide

8 Which row shows correct statements about the speed at which a gas diffuses?

	effect of molecular mass	effect of temperature
A	higher molecular mass diffuses faster	diffusion is faster at higher temperatures
B	higher molecular mass diffuses faster	diffusion is faster at lower temperatures
C	lower molecular mass diffuses faster	diffusion is faster at higher temperatures
D	lower molecular mass diffuses faster	diffusion is faster at lower temperatures

9 What happens when sodium chloride melts?

A Covalent bonds in a giant lattice are broken.

B Electrons are released from atoms.

C Electrostatic forces of attraction between ions are overcome.

D Molecules are separated into ions.

10 Using the Periodic Table for the relative atomic masses, which has the greatest mass?

A 0.1 moles of iodine molecules, I_2

B 0.5 moles of carbon dioxide, CO_2

C 1.0 mole of beryllium oxide, BeO

D 1.0 mole of sodium, Na

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11 Ammonia is manufactured from nitrogen and hydrogen by the Haber process.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

What is the percentage yield when 60 kg of ammonia is produced from 60 kg of hydrogen?

A 5.9% **B** 17.6% **C** 35.3% **D** 50.0%

12 What is the relative molecular mass, M_r, of $CuSO_4.5H_2O$?

A 127 **B** 160 **C** 178 **D** 250

13 The list shows some substances that conduct electricity.

1 aqueous sodium chloride

2 copper

3 graphite

In which substance(s) are only electrons involved in the conduction?

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

14 Caesium is a Group I metal.

Which reaction involving this element would **not** produce hydrogen?

A adding caesium to ethanoic acid

B adding caesium to water

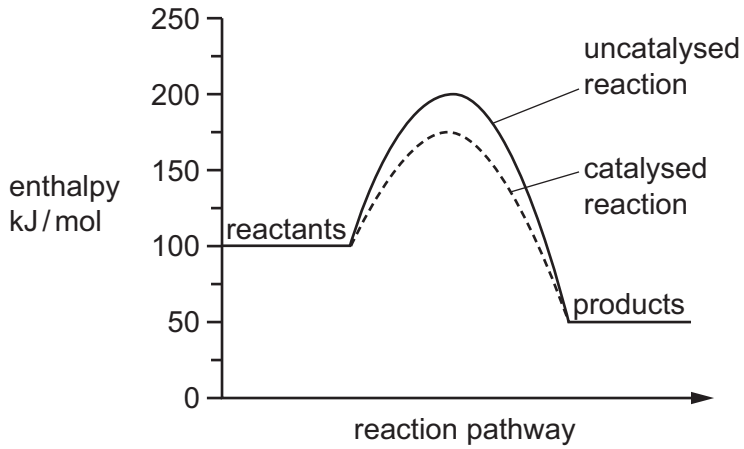
C electrolysing aqueous caesium chloride

D electrolysing molten caesium chloride

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[Turn over

15 The energy diagram represents a chemical reaction carried out both with a catalyst and without a catalyst.



What is the enthalpy change for the catalysed reaction?

A –125 kJ / mol **B** –50 kJ / mol **C** +75 kJ / mol **D** +100 kJ / mol

16 Hydrogen reacts with iodine to form hydrogen iodide. This is a slow reaction.

$$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$$

1 mole of hydrogen gas and 1 mole of iodine vapour were mixed and allowed to react. After *t* seconds, 0.6 moles of hydrogen remained.

What is the number of moles of iodine remaining after *t* seconds?

A 0.0 **B** 0.4 **C** 0.6 **D** 1.0

17 Acidified potassium manganate(VII) is used as a test reagent.

When it is added to an aqueous solution of compound **X**, the colour of the test reagent changes from .....1..... . This colour change shows that **X** is .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	colourless to purple	oxidised
B	colourless to purple	reduced
C	purple to colourless	oxidised
D	purple to colourless	reduced

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18 You are supplied with dilute hydrochloric acid together with

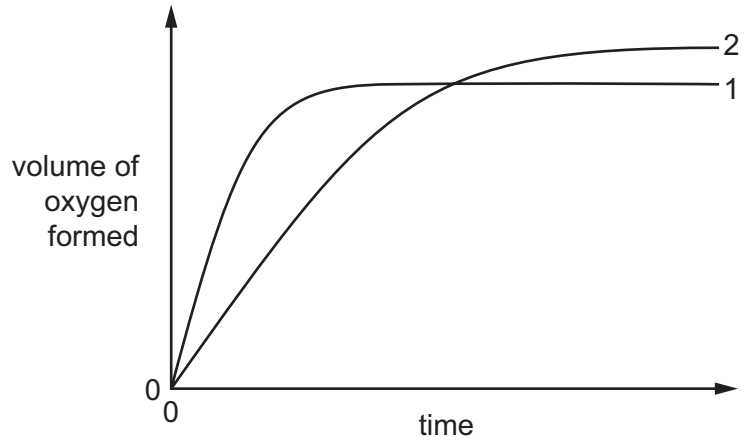
- copper solid,
- magnesium solid,
- aqueous lead nitrate,
- aqueous silver nitrate.

How many different insoluble chlorides could you make?

A 1 **B** 2 **C** 3 **D** 4

19 In the graph, curve 1 was obtained by observing the decomposition of 100 cm^3 of 1.0 mol/dm^3 hydrogen peroxide solution, catalysed by manganese(IV) oxide.

$$2H_2O_2 \rightarrow 2H_2O + O_2$$



Which alteration to the original experimental conditions would produce curve 2?

A adding some 0.1 mol/dm^3 hydrogen peroxide solution

B lowering the temperature

C using less manganese(IV) oxide

D using a different catalyst

20 A colourless solution reacts with magnesium to form a salt and hydrogen gas.

How is this solution acting?

A as a base

B as a reducing agent

C as a solvent

D as an acid

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21 The equation shows a redox reaction between iron(II) chloride and chlorine gas.

$$2FeCl_2 + Cl_2 \rightarrow 2FeCl_3$$

Which equation describes the reduction process in this reaction?

A $2Cl^- \rightarrow Cl_2 + 2e^-$

B $Cl_2 + 2e^- \rightarrow 2Cl^-$

C $Fe^{2+} \rightarrow Fe^{3+} + e^-$

D $Fe^{3+} + e^- \rightarrow Fe^{2+}$

22 Which compound produces the greatest number of ions when 1 mole is dissolved in water?

A aluminium sulfate

B ammonium carbonate

C ammonium nitrate

D calcium nitrate

23 The equation for the reaction taking place during the production of ammonia is shown.

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

The reaction is carried out between 350 °C and 450 °C and at around 200 atmospheres pressure using an iron catalyst.

Which statement is **not** correct?

A At higher temperatures the amount of ammonia present at equilibrium is less.

B Changing the pressure has no effect on the rate of reaction.

C The catalyst is used to speed up the reaction.

D When the reaction is at equilibrium, the forward reaction is taking place at the same rate as the backward reaction.

24 Which element is sodium?

	melting point in °C	electrical conduction	density in g / cm^3
A	1535	good	7.86
B	1083	good	8.92
C	113	poor	2.07
D	98	good	0.97

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25 From their position in the Periodic Table, what would you expect the elements titanium, vanadium, chromium and cobalt to have in common?

1 variable oxidation states

2 coloured compounds

3 high melting points

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

26 Which two gases do **not** damage limestone buildings?

A nitrogen and carbon monoxide

B nitrogen dioxide and carbon monoxide

C nitrogen dioxide and carbon dioxide

D sulfur dioxide and carbon dioxide

27 The following facts are known about four metals, P, Q, R and S.

1 R displaces both P and S from aqueous solutions of their ions.

2 Q reacts with water but R does not react with water.

3 S does not react with acid but P does react with acid.

What is the correct order of reactivity, the most reactive first?

A $P \rightarrow S \rightarrow Q \rightarrow R$

B $Q \rightarrow R \rightarrow P \rightarrow S$

C $Q \rightarrow S \rightarrow P \rightarrow R$

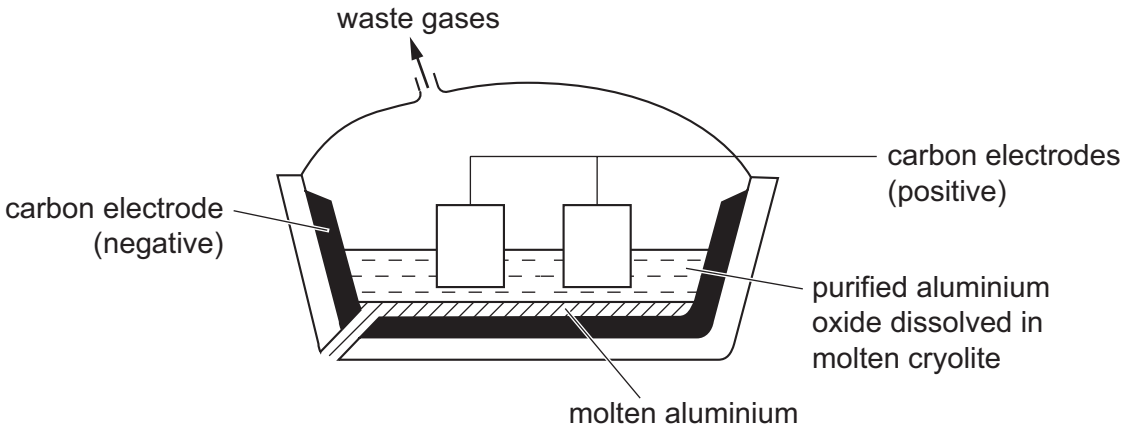
D $S \rightarrow P \rightarrow R \rightarrow Q$

28 Which metal has to be extracted from its ore by electrolysis?

A Fe **B** Na **C** Pb **D** Zn

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29 Aluminium is produced by the electrolysis of molten aluminium oxide.



Which statement about the process is correct?

A Aluminium ions are reduced to aluminium by gaining electrons.

B Aluminium oxide is reduced by cryolite.

C Aluminium oxide is reduced by the carbon electrodes.

D Aluminium oxide is reduced by the carbon monoxide formed at the negative electrode.

30 Hydrides are compounds of an element and hydrogen only.

Which statement is **not** correct?

A The hydride of carbon that contains four hydrogen atoms and one carbon atom, is a gas called methane.

B The hydride of chlorine dissolves in water to form an alkaline solution.

C The hydride of nitrogen is manufactured in the Haber process.

D The hydride of oxygen is a liquid at room temperature.

31 In the extraction of iron from its ore in the blast furnace, limestone is added.

What is the function of the limestone?

A to decrease the melting point of the iron

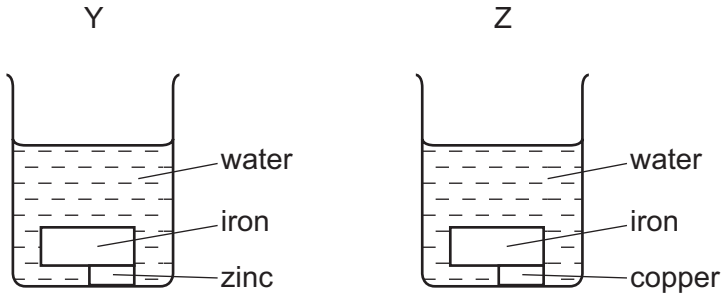
B to produce carbon monoxide for the reduction of the iron ore

C to produce heat to melt the iron formed

D to remove sand

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32 Two pieces of iron, one with zinc attached and the other with copper attached, are placed separately in water as shown.



Which statements are correct?

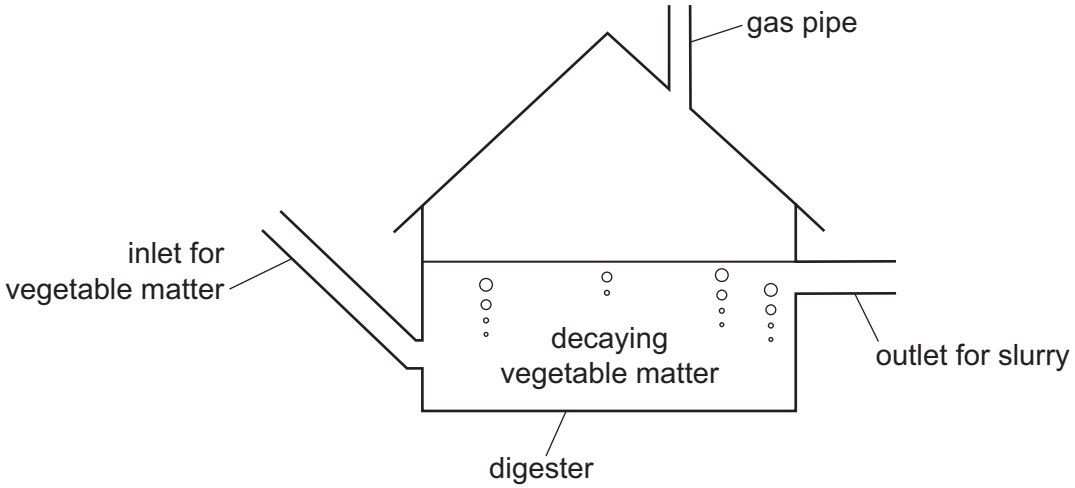
1 The iron in Y will not rust.

2 The water in Z will turn blue.

3 The zinc in Y will be oxidised.

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

33 A diagram of a biogas generator is shown.



The gas, if collected, can be used as a fuel.

However, if the gas is allowed to escape it becomes an atmospheric pollutant.

What is the gas?

A carbon monoxide

B methane

C nitrogen

D sulfur dioxide

34 Which statement about alkanes is correct?

A Alkanes are readily polymerised.

B Alkanes react with bromine by addition.

C Alkanes react with chlorine by substitution.

D Butane has three more carbon atoms and eight more hydrogen atoms than methane.

35 Which statement about members of the homologous series of alcohols is correct?

A An alcohol with two carbon atoms in each molecule is called methanol.

B Butanol can be combusted to give carbon dioxide and water only.

C Ethanol is the only alcohol that can be oxidised to a carboxylic acid.

D Propanol can be made by the catalysed addition of steam to ethene.

36 When cracked, one mole of a compound, **X**, produces one mole of propene and one mole of hydrogen.

$$\mathbf{X} \rightarrow C_3H_6 + H_2$$

What type of compound is **X**?

A an alcohol

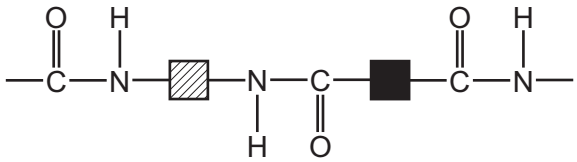
B an alkane

C an alkene

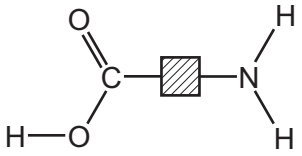
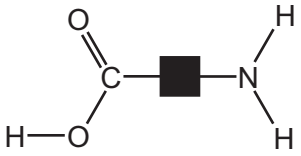
D a carboxylic acid

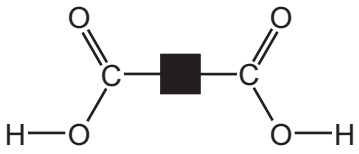
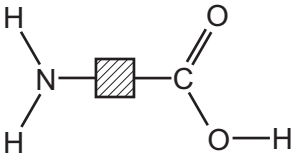
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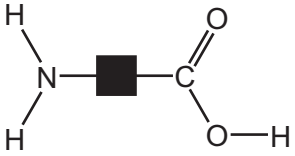
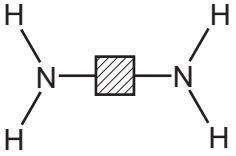
37 The diagram shows the partial structure of a polymer.

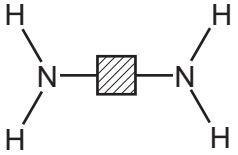
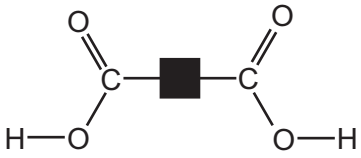


Which pair of reagents could have been used to form this polymer?

A  and 

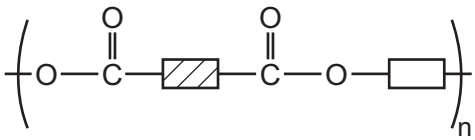
B  and 

C  and 

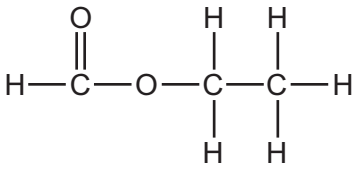
D  and 

38 Which of the following has **not** been prepared by reacting a carboxylic acid with an alcohol?

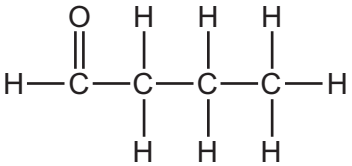
A



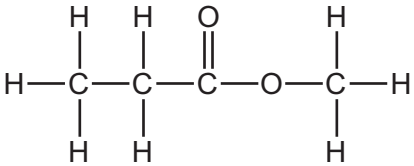
B



C



D



39 Which statement about the properties of the four alkanes from methane to butane is **not** correct?

A Successive members of the series differ in formula by CH_2.

B They increase in boiling point.

C They increase in viscosity.

D They share the same empirical formula.

40 Which of these polymers is a protein?

A $(C_2H_3Cl)_n$ **B** $(C_5H_8O_2)_n$ **C** $(C_6H_{10}O_5)_n$ **D** $(C_2H_3NO)_n$

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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						12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10		
7 Li Lithium 3	9 Be Beryllium 4									11 B Boron 5	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18		
23 Na Sodium 11	24 Mg Magnesium 12									27 Al Aluminium 13	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	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	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
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	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
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						
	226 Ra Radium 88	227 Ac Actinium 89 †															

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

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.).

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