Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **October/November 2016**

1 hour

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

* 5 2 2 9 0 4 3 9 7 7 *

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.

IB16 11_5070_12/5RP
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1 When measured under the same conditions, which gas diffuses at the same rate as nitrogen?

A ammonia, NH_3

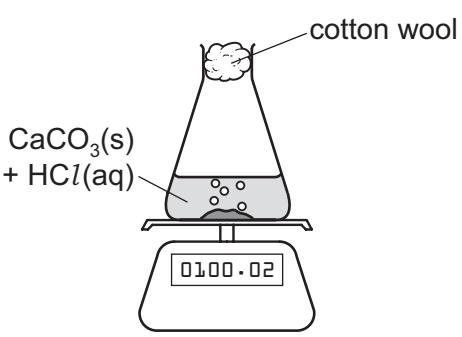
B carbon monoxide, CO

C ethane, C_2H_6

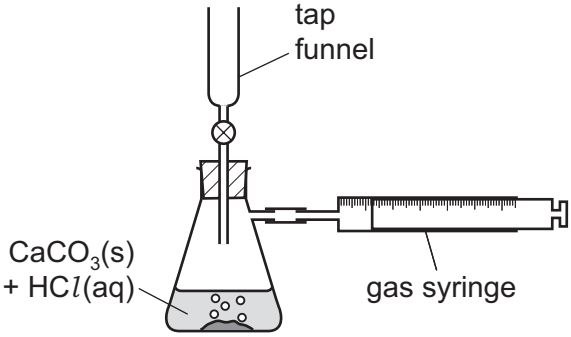
D oxygen, O_2

2 When calcium carbonate is added to dilute hydrochloric acid, carbon dioxide gas is released.

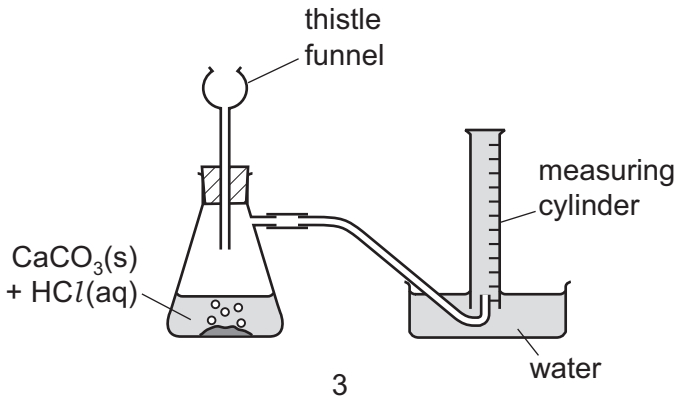
Three sets of apparatus are shown.



1



2



3

Which sets of apparatus are suitable, together with a stopwatch, for following the rate of this reaction?

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

3 Which statement is correct?

A Carbon monoxide reduces sodium oxide to sodium.

B During the electrolysis of copper(II) sulfate solution, hydrogen is liberated at the positive electrode.

C Recycling aluminium conserves the Earth's finite supply of haematite.

D Iron oxide is reduced to iron in the blast furnace.

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4 Benzene and cyclohexane are both flammable liquids. They are able to mix with each other without separating into two layers. They have very similar boiling points. It is difficult to separate a mixture of these two liquids by fractional distillation.

Why is it difficult to separate a mixture of benzene and cyclohexane by fractional distillation?

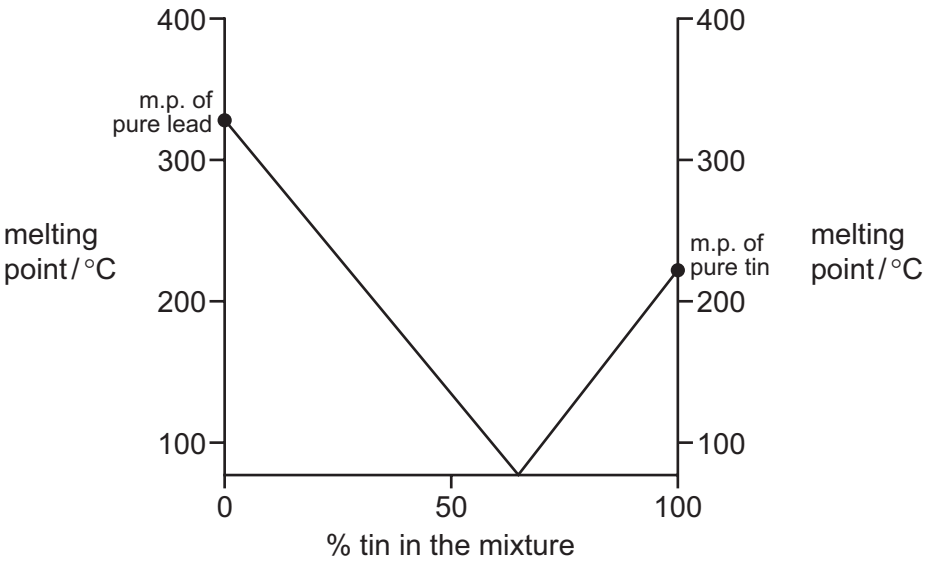
A They are both flammable.

B They are both liquids.

C They have very similar boiling points.

D They mix with each other completely.

5 The graph gives the melting points (m.p.) of mixtures of lead and tin.



The graph shows that any mixture of lead and tin must have a melting point that is

A above that of tin.

B below that of lead.

C below that of both tin and lead.

D between that of tin and lead.

6 Which statement about chlorine atoms and chloride ions is correct?

A They are both isotopes of chlorine.

B They undergo the same chemical reactions.

C They have the same number of protons.

D They have the same physical properties.

7 When substance Q melts, only weak forces of attraction between its molecules are overcome.

Which row correctly describes Q?

	melting point / °C	electrical conduction of solid Q
A	44	non-conductor
B	98	conductor
C	660	conductor
D	714	non-conductor

8 A solution containing lead(II) ions is added to a solution containing iodide ions. A yellow precipitate is formed.

What is the equation for the reaction that occurs?

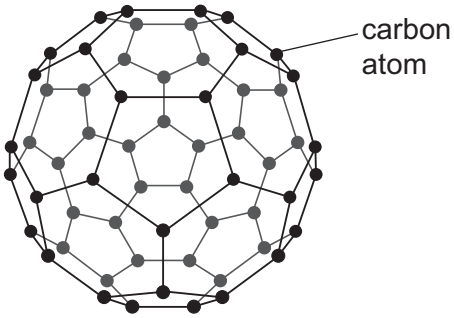
A $Pb^{+} + I^{-} \rightarrow PbI$

B $Pb^{+} + 2I^{-} \rightarrow PbI_2$

C $Pb^{2+} + I^{-} \rightarrow PbI$

D $Pb^{2+} + 2I^{-} \rightarrow PbI_2$

9 Buckminsterfullerene has the chemical formula C_{60}.



buckminsterfullerene

How is the structure of buckminsterfullerene best described?

A a covalent compound

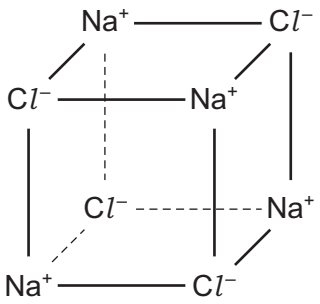
B an ionic compound

C a polymer

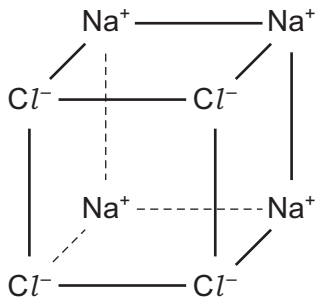
D molecular

10 Which diagram correctly shows the arrangement of the ions in solid sodium chloride?

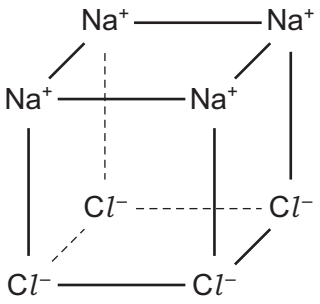
A



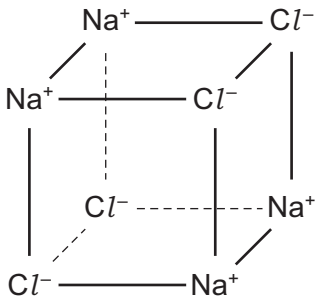
B



C



D



11 Aqueous sodium hydroxide is added to a sample of a colourless solution. Aqueous ammonia is added to a separate sample of the colourless solution.

In both cases a white precipitate forms which is soluble in excess reagent.

Which positive ion is present in the solution?

A aluminium

B calcium

C copper(II)

D zinc

12 In an experiment, $1\,cm^3$ of a gaseous hydrocarbon, **Z**, requires $4\,cm^3$ of oxygen for complete combustion to give $3\,cm^3$ of carbon dioxide. All gas volumes are measured at r.t.p.

Which formula represents **Z**?

A C_2H_2 **B** C_2H_4 **C** C_3H_4 **D** C_3H_8

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13 Which is the best conductor of electricity?

A diamond

B magnesium

C pure ethanoic acid

D solid sodium chloride

14 Molten salts of four metals are electrolysed.

The ions of which metal require the smallest number of electrons for one mole of atoms to be liberated during electrolysis?

A aluminium

B calcium

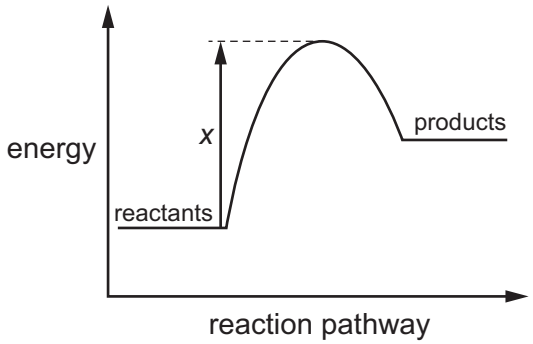
C iron

D sodium

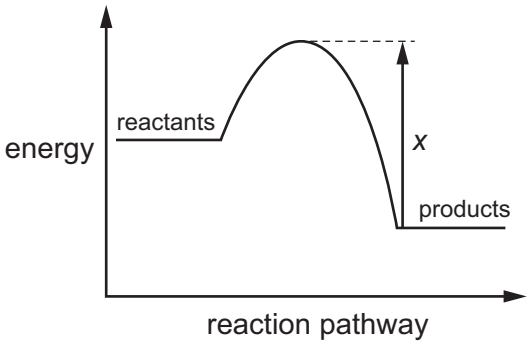
15 An endothermic reaction has an activation energy of *x*.

Which energy profile diagram is correct for this reaction?

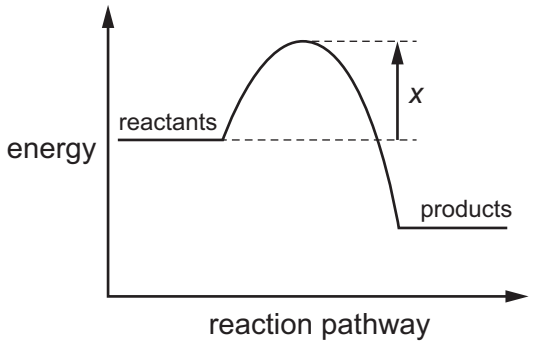
A



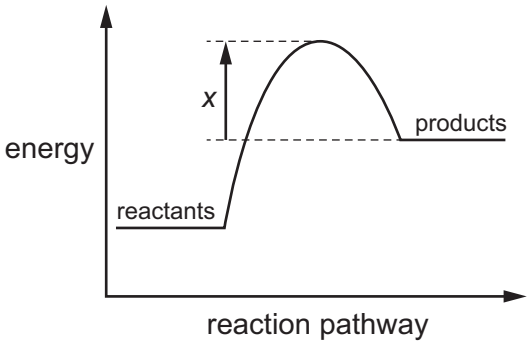
B



C



D



16 The following statements refer to the use of catalysts in chemical reactions.

1 A catalyst increases the activation energy of a reaction.

2 A catalyst increases the rate of a reaction.

3 A catalyst increases the yield of a reaction.

Which statements are correct?

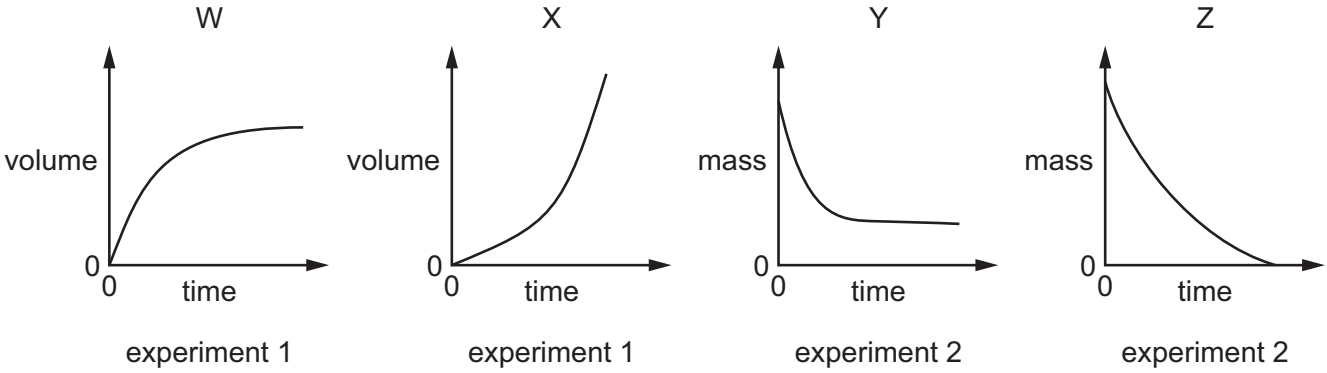
A 1, 2 and 3 **B** 2 and 3 only **C** 2 only **D** 3 only

17 In two experiments, 1 and 2, an excess of powdered calcium carbonate was reacted in a flask with dilute hydrochloric acid.

In experiment 1, the carbon dioxide evolved was collected and the volume of gas measured at regular intervals.

In experiment 2, the mass of the flask and its contents was measured at regular intervals.

The results of both experiments were plotted on graphs.



Which graphs correctly show the results of these two experiments?

	experiment 1	experiment 2
A	W	Y
B	W	Z
C	X	Y
D	X	Z

18 Iron(II) ions react with chlorine.

$$2Fe^{2+}(aq) + Cl_2(g) \rightarrow 2Fe^{3+}(aq) + 2Cl^-(aq)$$

Which statement about this reaction is correct?

A Chlorine is reduced by iron(II) ions.

B Chlorine is the reducing agent.

C Iron(II) ions are reduced by chlorine.

D Iron(II) ions are the oxidising agent.

19 When water is liquid, it ionises slightly.

$$H_2O(l) \rightleftharpoons H^+(aq) + OH^-(aq)$$

The forward reaction is endothermic.

When the temperature of water is increased, which change(s) take place?

1 The water becomes acidic.

2 The water becomes alkaline.

3 More water molecules form ions.

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

20 The table shows some properties of four metal chlorides.

Which row is magnesium chloride?

	colour	solubility in water	method of preparation
A	green	insoluble	precipitation
B	green	soluble	metal and acid
C	white	insoluble	precipitation
D	white	soluble	metal and acid

21 Which statement about the uses of metals is **not** correct?

A Aluminium is used for making food containers and electrical cables.

B Copper is used for making brass.

C Iron is used as a catalyst in the contact process.

D Nickel is used as a catalyst in the hydrogenation of alkenes.

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22 A lump of element **X** can be cut by a knife.

During its reaction with water, **X** floats and melts.

What is **X**?

A calcium

B copper

C magnesium

D potassium

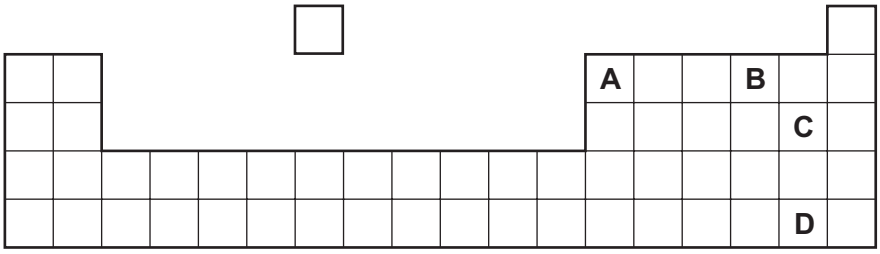
23 Which row is a transition element?

	melting point / °C	density in g / cm^3
A	44	1.82
B	181	0.53
C	271	9.75
D	1244	7.20

24 Element *Z* combines with sodium to form the compound Na_2Z.

The positions of four elements are shown on the outline of part of the Periodic Table.

Which is element *Z*?



25 The table shows the observations made when an aqueous solution of salt Z has different reagents added to it.

reagent(s) added	observation
aqueous sodium hydroxide	green precipitate formed
dilute nitric acid then aqueous barium nitrate	white precipitate formed

What is Z?

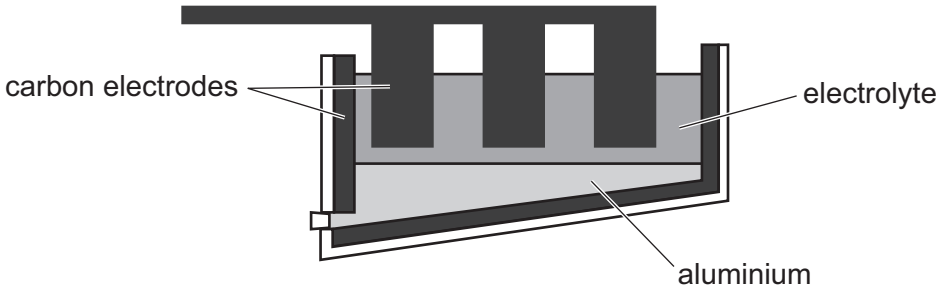
A copper(II) chloride

B copper(II) sulfate

C iron(II) chloride

D iron(II) sulfate

26 The diagram shows the apparatus used to extract aluminium from aluminium oxide.



Which statement about this process is correct?

A The electrolyte is a solid mixture of aluminium oxide and cryolite.

B The electrolyte is aluminium oxide dissolved in water.

C The equation for the reaction at the positive electrode is $Al^{3+} + 3e^- \rightarrow Al$.

D The positive carbon electrodes lose mass during the process and need regular replacement.

27 Which reaction is **not** a redox reaction?

A $CaCO_3 \rightarrow CaO + CO_2$

B $2C + O_2 \rightarrow 2CO$

C $C + CO_2 \rightarrow 2CO$

D $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

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28 Aqueous copper(II) sulfate solution is placed in an iron container and left to stand for several days.

Which statement describes what happens?

A Atmospheric oxygen reacts with the copper(II) sulfate to give black copper(II) oxide.

B Some fine iron particles are formed in the solution.

C The part of the container in contact with the solution is coated with copper.

D The solution turns from green to blue.

29 In the manufacture of paper, sulfur dioxide is used to remove the yellow colour from the wood pulp.

Which term can be used to describe sulfur dioxide in this process?

A a bleach

B a catalyst

C an oxidising agent

D a solvent

30 Which statement about the uses of gases is **not** correct?

A Helium is used in balloons because it is unreactive and less dense than air.

B Hydrogen is used in an addition reaction with saturated vegetable oils to form margarine.

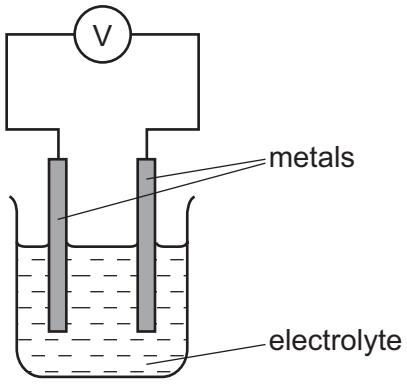
C Nitrogen from the air is used in the manufacture of ammonia.

D Oxygen is used in making steel and welding.

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[Turn over

31 Electrical energy can be generated using simple cells as shown.



Which pair of metals, when used as electrodes, will give the largest reading on the voltmeter, V?

A lead and sodium

B magnesium and copper

C potassium and silver

D sodium and potassium

32 When reacted with an excess of dilute hydrochloric acid, 0.002 moles of a metal *M* liberated 48 cm^3 of hydrogen measured at r.t.p.

Which equation is correct for this reaction?

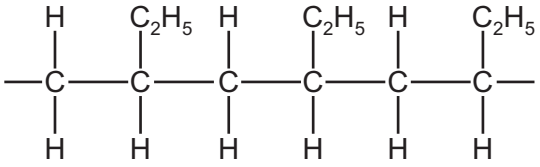
A $2M + 2H^+ \rightarrow 2M^+ + H_2$

B $M + H^+ \rightarrow M^+ + H$

C $M + 2H^+ \rightarrow M^{2+} + H_2$

D $M + 2H^+ \rightarrow M^{2+} + 2H$

33 The diagram shows a section of a polymer.



Which alkene is used to make this polymer?

A $CH_3CH{=}CH_2$

B $CH_3CH_2CH{=}CH_2$

C $CH_3CH_2CH{=}CHCH_3$

D $CH_3CH{=}CHCH_3$

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34 The table shows some atmospheric pollutants and their possible effects.

Which row is **not** correct?

	pollutant	effect
A	CFCs	cause depletion of the ozone layer
B	CO_2	forms photochemical smog
C	CO	is poisonous to humans
D	NO_2	forms acid rain

35 Which compound is the most viscous and the least flammable?

A C_6H_{14} **B** C_8H_{18} **C** $C_{10}H_{22}$ **D** $C_{12}H_{26}$

36 How many moles of ethanoic acid, CH_3CO_2H, react with one mole of magnesium?

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

37 With which substance will ethene react to form more than one product?

A argon

B hydrogen

C oxygen

D steam

38 Which statement about isomers of a compound is always correct?

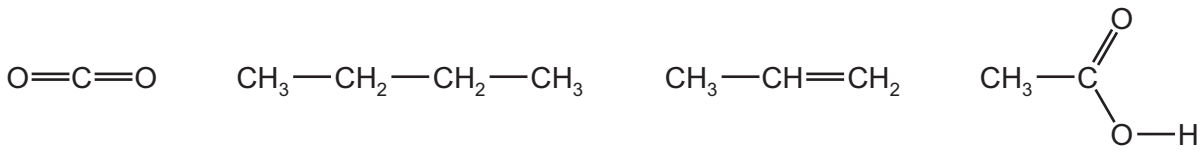
A They have different empirical formulae.

B They have different relative molecular masses.

C They have only carbon and hydrogen in their molecules.

D They have the same molecular formula.

39 How many of the structures show an unsaturated hydrocarbon molecule?



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

40 Which type of polymer is made by reacting amino acids together?

A an addition polymer

B a carbohydrate

C a polyamide

D a polyester

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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