**eduresourceza.com**

Downloaded from eduresourceza.com

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**CHEMISTRY** **0620/13**

Paper 1 Multiple Choice **May/June 2011**

**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 **16** printed pages.


© UCLES 2011

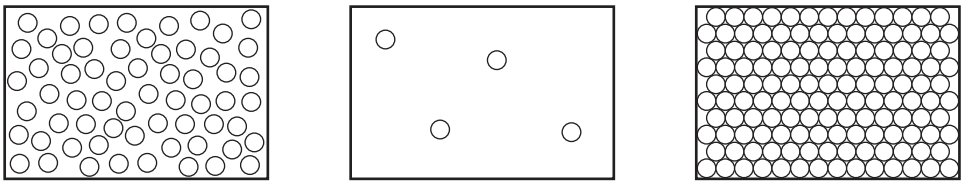
UNIVERSITY of CAMBRIDGE
International Examinations



Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**1** The diagrams show the arrangement of particles in three different physical states of substance X.



state 1 state 2 state 3

Which statement about the physical states of substance X is correct?

**A** Particles in state 1 vibrate about fixed positions.

**B** State 1 changes to state 2 by diffusion.

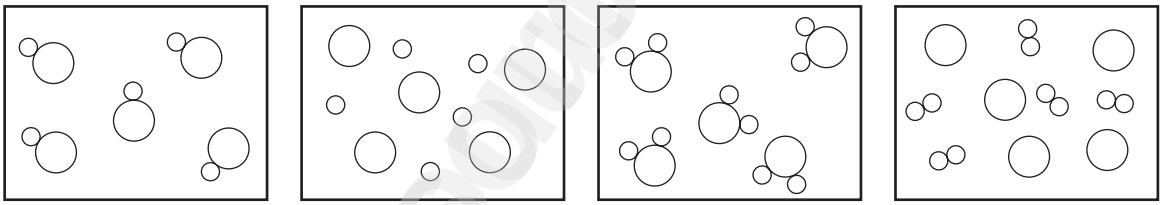
**C** State 2 changes directly to state 3 by condensation.

**D** The substance in stage 3 has a fixed volume.

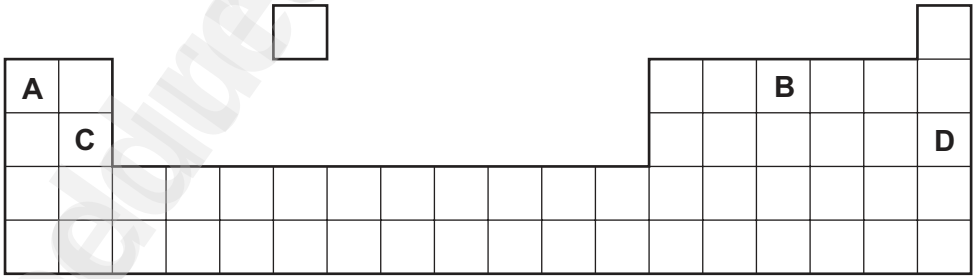
**2** In the diagrams, circles of different sizes represent atoms of different elements.

Which diagram represents hydrogen chloride gas?

**A** **B** **C** **D**



**3** The diagram shows part of the Periodic Table.




Which element is correctly matched with its electronic structure?

| | electronic structure |
|---|---|
| **A** | 2,8,1 |
| **B** | 2,4 |
| **C** | 2,8,2 |
| **D** | 2,8 |

© UCLES 2011
Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**4** An aqueous solution is coloured.

Which method of separation would show that the solution contains ions of different colours?

**A** chromatography

**B** crystallisation

**C** distillation

**D** filtration

**5** The table gives the solubility of four substances in ethanol and in water.

A mixture containing all four substances is added to ethanol, stirred and filtered.

The solid residue is added to water, stirred and filtered.

The filtrate is evaporated to dryness, leaving a white solid.

Which is the white solid?

| | solubility in | |
|---|---|---|
| | ethanol | water |
| **A** | insoluble | insoluble |
| **B** | insoluble | soluble |
| **C** | soluble | insoluble |
| **D** | soluble | soluble |

**6** Which two elements react together to form an ionic compound?

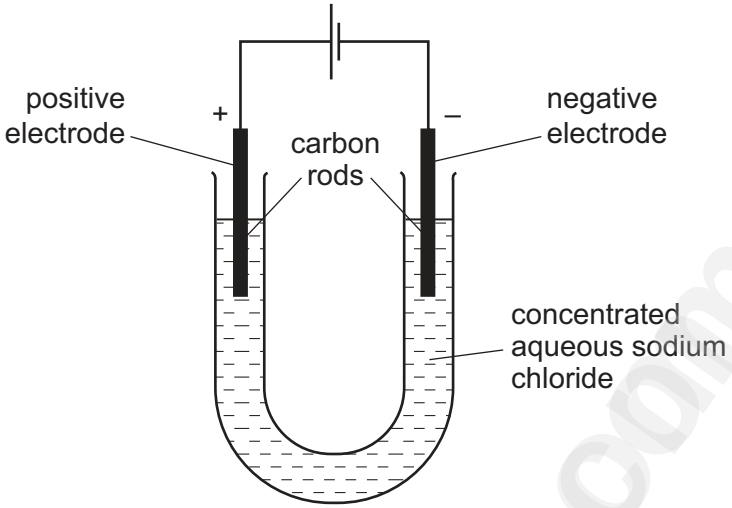
| element | electronic structure |
|---|---|
| W | 2,4 |
| X | 2,8 |
| Y | 2,8,1 |
| Z | 2,8,7 |

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


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**7** Electricity is passed through concentrated aqueous sodium chloride, as shown.




What is the test for the gas formed at the positive electrode?

**A** bleaches damp litmus paper

**B** 'pops' with a lighted splint

**C** relights a glowing splint

**D** turns damp red litmus paper blue

**8** Electricity from a power station passes through overhead cables to a substation and then to a school where it is used to electrolyse concentrated hydrochloric acid using inert electrodes.

Which substances are used for the overhead cables and for the electrodes?

| | overhead cables | electrodes |
|---|---|---|
| **A** | aluminium | copper |
| **B** | aluminium | platinum |
| **C** | copper | platinum |
| **D** | platinum | aluminium |

**9** The nucleon number and proton number of the lithium atom are shown by the symbol $^{7}_{3}Li$.

What is the correct symbol for the lithium ion in lithium chloride?

**A** $^{6}_{2}Li^{-}$ **B** $^{6}_{3}Li^{+}$ **C** $^{7}_{3}Li^{+}$ **D** $^{7}_{3}Li^{-}$


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**10** Three processes are listed.

burning methane in air

radioactive decay of $^{235}U$

reacting hydrogen with oxygen.

Which statements about these processes are correct?

1 Hydrogen and methane are being used as fuels.

2 All the processes involve oxidation.

3 All the processes are used to produce energy.

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

**11** Which statement about the electrolysis of molten lead(II) bromide is correct?

**A** A colourless gas is seen at the cathode.

**B** A grey metal is seen at the anode.

**C** A red / brown gas is seen at the anode.

**D** A red / brown metal is seen at the cathode.

**12** What is the relative molecular mass ($M_r$) of $HNO_3$?

**A** 5 **B** 31 **C** 32 **D** 63

**13** The equation for the effect of heat on hydrated sodium carbonate is as shown.

$$Na_2CO_3.10H_2O(s) \rightleftharpoons Na_2CO_3(s) + 10H_2O(g)$$

Statements made by four students about the reaction are given.

**P** Anhydrous sodium carbonate is formed.

**Q** Steam is formed.

**R** There is a colour change from blue to white.

**S** The reaction is reversible.

Which students' statements are correct?

**A** P, Q and R only

**B** P, Q and S only

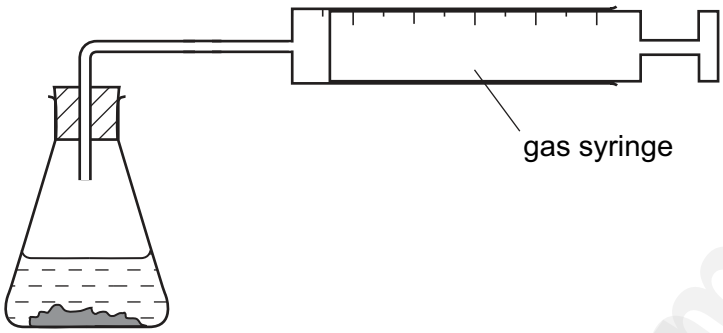
**C** Q, R and S only

**D** P, Q, R and S


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**14** The apparatus shown can be used to measure the rate of some chemical reactions.




For which two reactions would the apparatus be suitable?

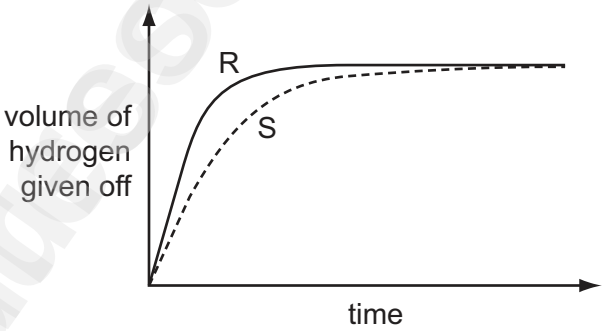
| | |
|---|---|
| reaction 1 | $AgNO_3(aq) + HCl(aq) \rightarrow AgCl(s) + HNO_3(aq)$ |
| reaction 2 | $2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$ |
| reaction 3 | $MgO(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2O(l)$ |
| reaction 4 | $ZnCO_3(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + CO_2(g) + H_2O(l)$ |

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

**15** A student investigates the rate of reaction between magnesium and excess sulfuric acid.

The volume of hydrogen given off in the reaction is measured over time.

The graph shows the results of two experiments, R and S.




Which change in conditions would cause the difference between R and S?

**A** A catalyst is added in S.

**B** The acid is more concentrated in R than in S.

**C** The magnesium is less finely powdered in R than in S.

**D** The temperature in R is lower than in S.

© UCLES 2011
Downloaded from eduresourceza.com

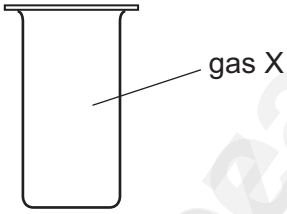
Downloaded from eduresourceza.com


**16** Butane, ethanol and hydrogen are fuels.

Which substances produce **both** carbon dioxide and water when used as a fuel?

| | butane | ethanol | hydrogen |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | ✗ |
| **C** | ✓ | ✗ | ✓ |
| **D** | ✗ | ✓ | ✗ |

**17** X is a monatomic gas.




Which statement about X is correct?

**A** X burns in air.

**B** X is coloured.

**C** X is unreactive.

**D** X will displace iodine from potassium iodide.

**18** The equation shows the reaction between a halogen and aqueous bromide ions.

$$X_2 + 2Br^-(aq) \rightarrow 2X^-(aq) + Br_2$$

…1… …2… …3…

Which words correctly complete gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|---|---|---|---|
| **A** | chlorine | brown | colourless |
| **B** | chlorine | colourless | brown |
| **C** | iodine | brown | colourless |
| **D** | iodine | colourless | brown |


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**19** Carbon dioxide is an acidic oxide that reacts with aqueous calcium hydroxide.

Which type of reaction takes place?

**A** decomposition

**B** fermentation

**C** neutralisation

**D** oxidation

**20** A solution contains barium ions and silver ions.

What could the anion be?

**A** chloride only

**B** nitrate only

**C** sulfate only

**D** chloride or nitrate or sulfate

**21** A mixture containing two anions was tested and the results are shown below.

| test | result |
|---|---|
| dilute nitric acid added | effervescence of a gas which turned limewater milky |
| dilute nitric acid added, followed by aqueous silver nitrate | yellow precipitate formed |

Which anions were present?

**A** carbonate and chloride

**B** carbonate and iodide

**C** sulfate and chloride

**D** sulfate and iodide

**22** Which is **not** a typical property of an acid?

**A** They react with alkalis producing water.

**B** They react with all metals producing hydrogen.

**C** They react with carbonates producing carbon dioxide.

**D** They turn litmus paper red.

© UCLES 2011
Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**23** The diagram shows a section of the Periodic Table.

| I | II | III | IV | V | VI | VII | 0 |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| V | | | W | | | X | |
| | Y | | | | Z | | |

Which elements will conduct electricity at room temperature?

**A** V, W and X **B** V, Y and W **C** W, X and Z **D** Y and Z

**24** Water from a reservoir flows to the water works where purification processes 1 takes place followed by process 2.

What are purification processes 1 and 2?

| | purification process 1 | purification process 2 |
|---|---|---|
| **A** | chlorination | filtration |
| **B** | filtration | chlorination |
| **C** | fractional distillation | filtration |
| **D** | filtration | fractional distillation |

**25** The properties of a metal are important in deciding its use.

Which row lists a property that is **not** correct for the use given?

| | use of the metal | metal property needed |
|---|---|---|
| **A** | aluminium in aircraft wings | low density |
| **B** | aluminium in food containers | resists corrosion |
| **C** | mild steel in car bodies | high density |
| **D** | stainless steel in cutlery | does not rust |


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**26** Brass is an alloy of copper and zinc.

Which statement is correct?

**A** Brass can be represented by a chemical formula.

**B** Brass is formed by a chemical reaction between copper and zinc.

**C** The alloy will dissolve completely in dilute hydrochloric acid.

**D** The zinc in the alloy will dissolve in dilute hydrochloric acid.

**27** Which statement is correct for the element of proton number 19?

**A** It is a gas that dissolves in water.

**B** It is a hard metal that is not very reactive with water.

**C** It is a non-metal that burns quickly in air.

**D** It is a soft metal that is highly reactive with water.

**28** Which row describes the conditions used to make steel from the iron produced by a blast furnace?

| | calcium oxide (lime) | oxygen | heat |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | ✗ |
| **C** | ✗ | ✓ | ✓ |
| **D** | ✗ | ✓ | ✗ |

© UCLES 2011
Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**29** The table shows the results of adding three metals, P, Q and R, to dilute hydrochloric acid and to water.

| metal | dilute hydrochloric acid | water |
|---|---|---|
| P | hydrogen produced | hydrogen produced |
| Q | no reaction | no reaction |
| R | hydrogen produced | no reaction |

What is the order of reactivity of the metals?

| | most reactive → | | least reactive |
|---|---|---|---|
| **A** | P | R | Q |
| **B** | P | Q | R |
| **C** | R | Q | P |
| **D** | R | P | Q |

**30** Which substance is a metal?

| | electrical conductivity (solid) | electrical conductivity (molten) |
|---|---|---|
| **A** | high | high |
| **B** | high | low |
| **C** | low | high |
| **D** | low | low |

**31** Greenhouse gases may contribute to climate change.

Two of these gases are emitted into the atmosphere as a result of processes within animals.

Gas ……1…… is produced by process ……3…… .

Gas ……2…… is produced by process ……4…… .

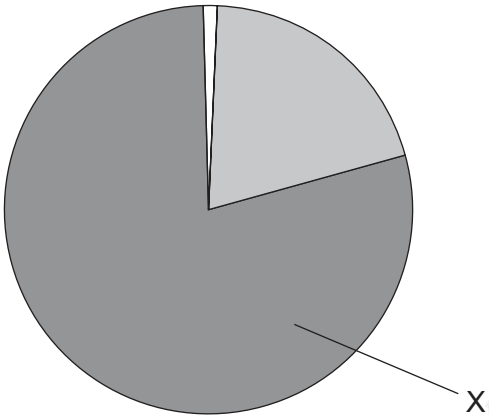
Which words correctly complete gaps 1, 2, 3 and 4?

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **A** | CO | $C_2H_6$ | digestion | respiration |
| **B** | CO | $C_2H_6$ | respiration | digestion |
| **C** | $CO_2$ | $CH_4$ | digestion | respiration |
| **D** | $CO_2$ | $CH_4$ | respiration | digestion |


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**32** The diagram shows the composition by volume of air.




What is X?

**A** argon

**B** carbon dioxide

**C** nitrogen

**D** oxygen

**33** The table gives the composition of the atmosphere of four newly discovered planets.

| planet | composition of atmosphere |
|---|---|
| W | argon, carbon dioxide and oxygen |
| X | argon, nitrogen and oxygen |
| Y | argon, carbon dioxide and methane |
| Z | methane, nitrogen and oxygen |

On which planets is the greenhouse effect likely to occur?

**A** W only

**B** W, X and Z

**C** W and Y only

**D** W, Y and Z

© UCLES 2011
Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**34** Which two substances, when reacted together, would form a salt that contains two of the essential elements provided by fertilisers?

**A** potassium hydroxide and nitric acid

**B** potassium hydroxide and sulfuric acid

**C** sodium hydroxide and nitric acid

**D** sodium hydroxide and sulfuric acid

**35** Statement 1: Alloying iron with other materials to form stainless steel prevents iron from rusting by excluding oxygen.

Statement 2: Painting, oiling and electroplating are all methods of preventing iron from rusting.

Which is correct?

**A** Both statements are correct and statement 2 explains statement 1.

**B** Both statements are correct but statement 2 does not explain statement 1.

**C** Statement 1 is correct but statement 2 is incorrect.

**D** Statement 2 is correct but statement 1 is incorrect.

**36** What is the main constituent of natural gas?

**A** carbon dioxide

**B** ethane

**C** hydrogen

**D** methane

**37** What is **not** essential for the formation of ethanol by fermentation?

**A** light

**B** sugar

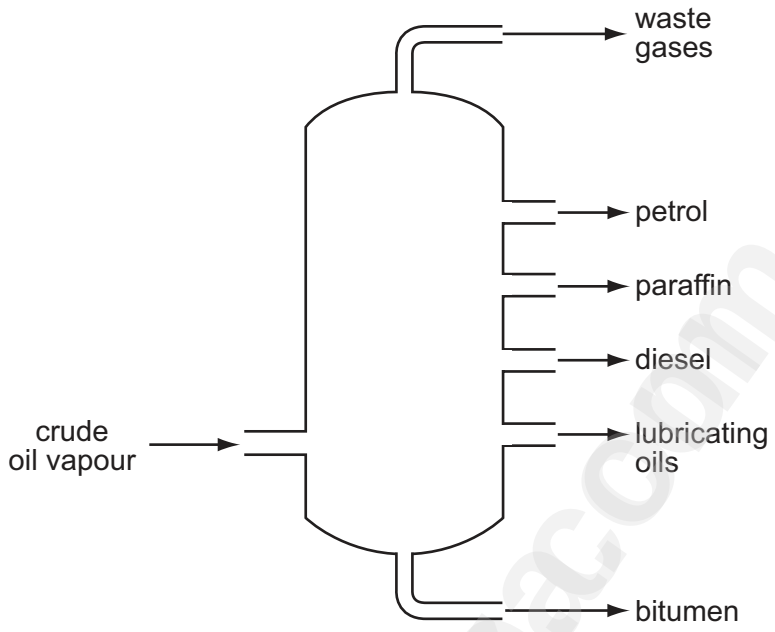
**C** yeast

**D** water

© UCLES 2011
Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**38** Which industrial process is shown in the diagram?



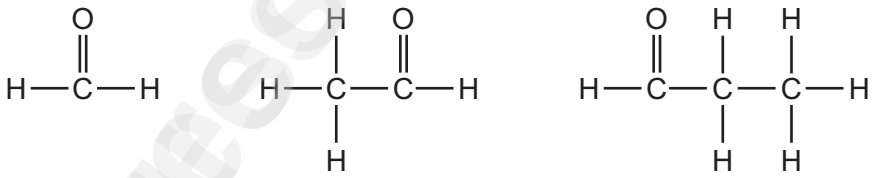

**A** cracking

**B** fermentation

**C** fractional distillation

**D** polymerisation

**39** The diagram shows the structures of three compounds.



Why do these three compounds belong to the same homologous series?

**A** They all contain carbon, hydrogen and oxygen.

**B** They all contain the same functional group.

**C** They are all carbon based molecules.

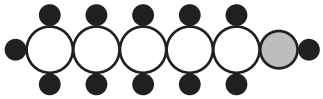
**D** They are all flammable liquids.

© UCLES 2011
Downloaded from eduresourceza.com

Downloaded from eduresourceza.com


**40** Compounds containing five carbon atoms in a molecule may have names beginning with ‘pent…’.

What is the name of the compound shown?



key

= carbon

= oxygen

= hydrogen

**A** pentane

**B** pentanoic acid

**C** pentanol

**D** pentene

eduresourceza.com


Downloaded from eduresourceza.com

Downloaded from eduresourceza.com



# DATA SHEET
## The Periodic Table of the Elements

| Group | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | II | | | | | | | | | | | III | IV | V | VI | VII | 0 |
| | | | | | | | 1 H Hydrogen 1 | | | | | | | | | | 4 He Helium 2 |
| 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 X b — 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.).

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2011



Downloaded from eduresourceza.com