UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY **5070/12**

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

1 hour

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

5566194136

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.

This document consists of **13** printed pages and **3** blank pages.

© UCLES 2011

1 A drop of liquid bromine is placed in the bottom of a gas jar. Brown fumes of bromine vapour slowly spread through the covered gas jar.

Why does this happen?

A Bromine vapour is less dense than air.

B Bromine molecules and the molecules in air are always moving around.

C Bromine molecules are smaller than the molecules in air.

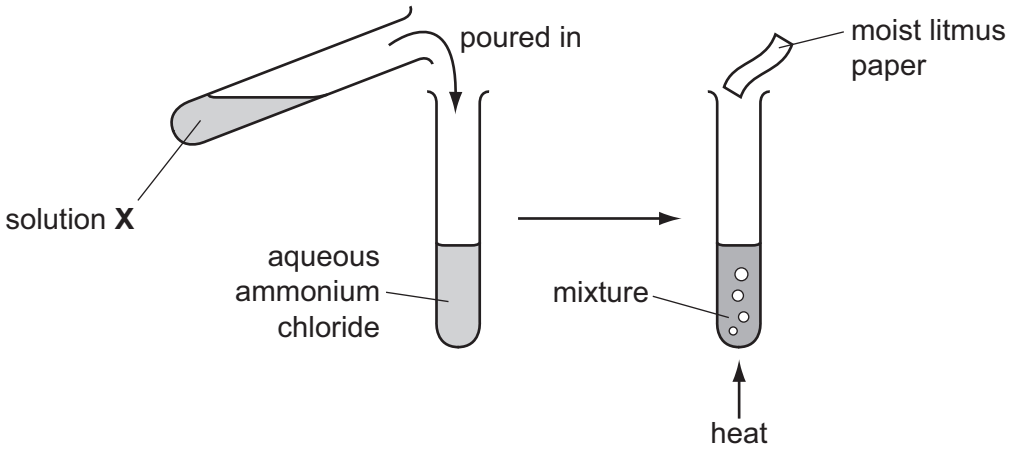
D Bromine molecules move faster than the molecules in air.

2 Copper(II) sulfate crystals are separated from sand using the four processes listed below.

In which order are these processes used?

	1st	2nd	3rd	4th
A	filtering	dissolving	crystallising	evaporating
B	filtering	dissolving	evaporating	crystallising
C	dissolving	evaporating	filtering	crystallising
D	dissolving	filtering	evaporating	crystallising

3 The diagrams show an experiment with aqueous ammonium chloride.



A gas, **Y**, is produced and the litmus paper changes colour.

What are solution **X** and gas **Y**?

	solution **X**	gas **Y**
A	aqueous sodium hydroxide	ammonia
B	aqueous sodium hydroxide	chlorine
C	dilute sulfuric acid	ammonia
D	dilute sulfuric acid	chlorine

© UCLES 2011

4 A student tested a solution by adding aqueous sodium hydroxide. A precipitate was not seen because the reagent was added too quickly.

What could **not** have been present in the solution?

A Al^{3+} **B** Ca^{2+} **C** NH_4^+ **D** Zn^{2+}

5 In which of the following is there a lattice of positive ions in a 'sea of electrons'?

A liquid potassium chloride

B sand

C solid graphite

D solid magnesium

6 What is the mass of oxygen contained in 72 g of pure water?
[Relative atomic masses: H = 1; O = 16]

A 16 g **B** 32 g **C** 64 g **D** 70 g

7 A covalent bond is formed by

A electron sharing between metals and non-metals.

B electron sharing between non-metals.

C electron transfer between non-metals.

D electron transfer from metals to non-metals.

8 Which molecule has the **largest** number of electrons involved in covalent bonds?

A C_2H_4 **B** CO_2 **C** CH_3OH **D** N_2

9 The equation for the reaction between calcium carbonate and hydrochloric acid is shown.

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

How many moles of calcium carbonate will give 24 cm^3 of carbon dioxide when reacted with an excess of the acid?

(Assume one mole of carbon dioxide occupies 24 dm^3.)

A 1 mol **B** 0.1 mol **C** 0.01 mol **D** 0.001 mol

10 Element *X* has the electronic structure 2,8,5. Element *Y* has the electronic structure 2,8,7.

What is the likely formula of a compound containing only *X* and *Y*?

A XY_3 **B** X_2Y_3 **C** X_3Y **D** X_3Y_2

© UCLES 2011

11 The empirical formula of a liquid compound is C_2H_4O.

To find the empirical formula, it is necessary to know the

A density of the compound.

B percentage composition of the compound.

C relative molecular mass of the compound.

D volume occupied by 1 mole of the compound.

12 Which statement about both chlorine atoms and chloride ions is correct?

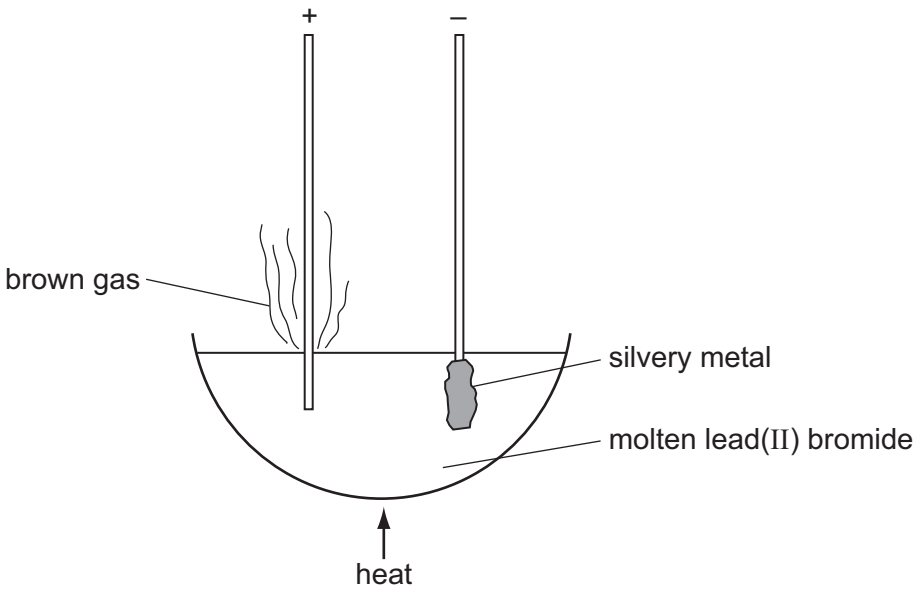
A They are chemically identical.

B They are isotopes of chlorine.

C They have the same number of protons.

D They have the same physical properties.

13 The diagram shows the electrolysis of molten lead(II) bromide using inert electrodes.



What happens during this electrolysis?

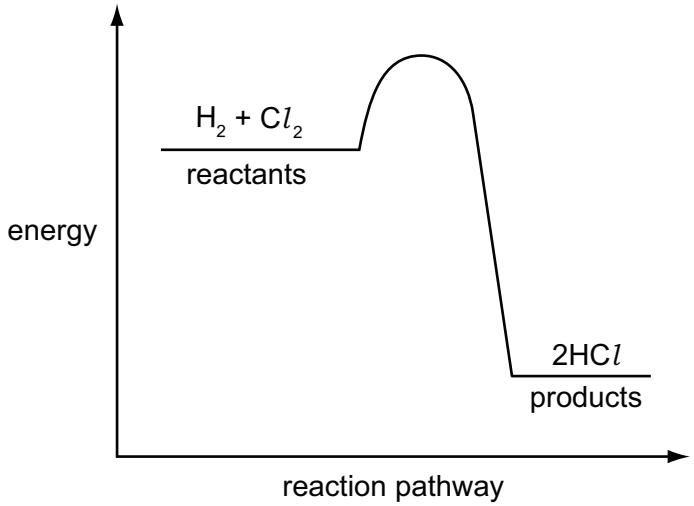
A Atoms change to ions.

B Covalent bonds are broken.

C Ions change to atoms.

D New compounds are formed.

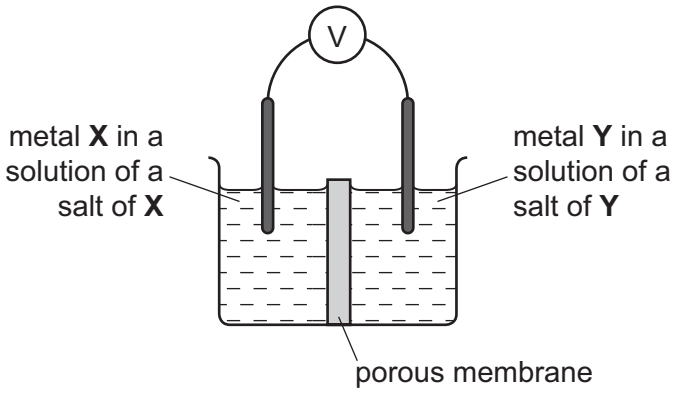
14 The energy profile diagram for the reaction between hydrogen and chlorine is shown.



What information about this reaction does the diagram show?

	type of reaction	sign of enthalpy change, ΔH
A	endothermic	negative
B	endothermic	positive
C	exothermic	negative
D	exothermic	positive

15 Which pair of metals **X** and **Y** will produce the highest voltage when used as electrodes in a simple cell?



	metal **X**	metal **Y**
A	copper	silver
B	magnesium	silver
C	magnesium	zinc
D	zinc	copper

© UCLES 2011

16 The equation shows what happens in 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 $Fe^{3+} + e^- \rightarrow Fe^{2+}$

17 Which acid and base react together to produce an **insoluble** salt?

A hydrochloric acid and sodium hydroxide

B nitric acid and calcium oxide

C sulfuric acid and barium hydroxide

D sulfuric acid and zinc oxide

18 Carbon and silicon are both in Group IV of the Periodic Table.

Which statement is correct for both carbon dioxide and silicon dioxide?

A They are acidic oxides.

B They are readily soluble in water.

C They contain ionic bonds.

D They have giant molecular structures.

19 The following changes could be made to the conditions in the reaction between zinc and hydrochloric acid.

1 increase in concentration of the acid

2 increase in particle size of the zinc

3 increase in pressure on the system

4 increase in temperature of the system

Which pair of changes will increase the rate of reaction?

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

© UCLES 2011

20 Which calcium compound does **not** increase the pH of acidic soils?

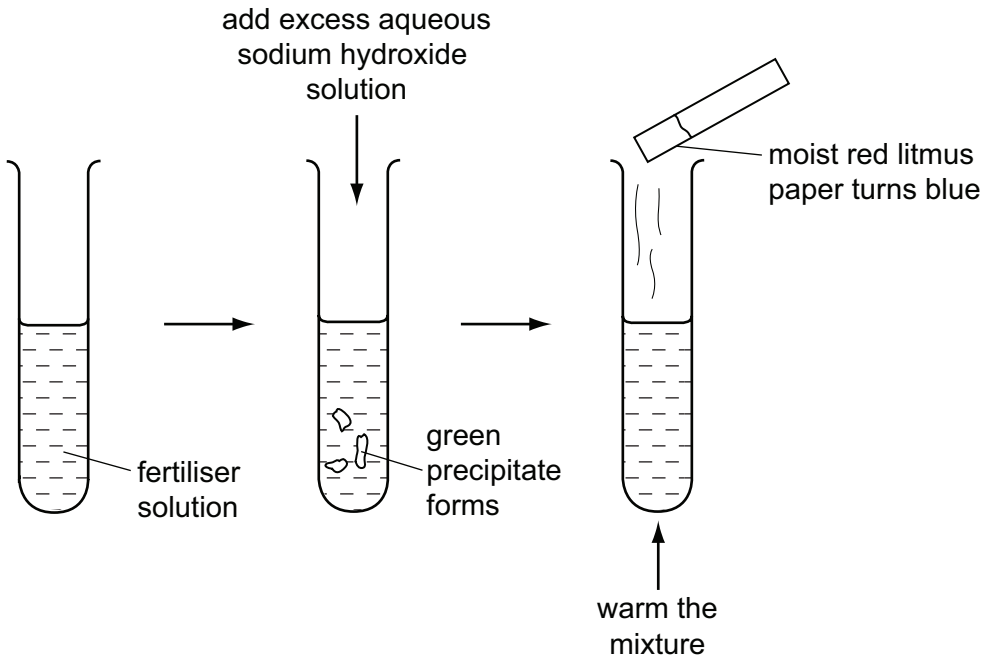
A calcium carbonate

B calcium hydroxide

C calcium oxide

D calcium sulfate

21 A solution of fertiliser was tested as shown.



Which ions must be present in the fertiliser?

A Fe^{2+} and SO_4^{2-}

B Fe^{3+} and NO_3^-

C NH_4^+ and Fe^{2+}

D NH_4^+ and NO_3^-

22 Which pair of properties are **both** correct for a typical transition element?

	property 1	property 2
A	forms coloured compounds	soluble in water
B	high density	has variable oxidation states
C	low density	high melting point
D	low melting point	can act as a catalyst

© UCLES 2011

23 What happens when zinc foil is placed in an aqueous solution of copper(II) sulfate?

A Copper(II) ions are oxidised.

B There is no reaction.

C Zinc atoms are oxidised.

D Zinc sulfate is precipitated.

24 Which deduction about the element astatine, At, can be made from its position in Group VII?

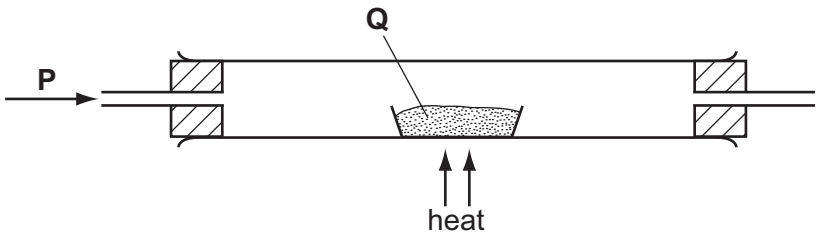
A It forms covalent compounds with sodium.

B It is a gas.

C It is displaced from aqueous potassium astatide, KAt, by chlorine.

D It is more reactive than iodine.

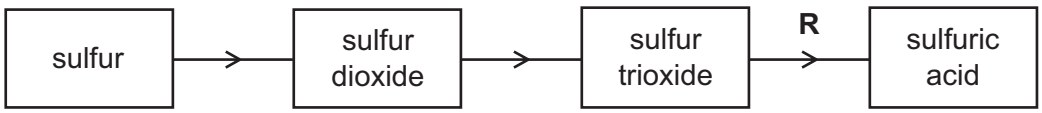
25 In the apparatus shown, gas **P** is passed over solid **Q**.



No reaction occurs if **P** and **Q** are

	P	Q
A	hydrogen	lead(II) oxide
B	hydrogen	magnesium oxide
C	oxygen	carbon
D	oxygen	sulfur

26 The diagram represents the manufacture of sulfuric acid by the Contact process.



What is used in step **R**?

A concentrated sulfuric acid followed by water

B vanadium(V) oxide

C water followed by concentrated sulfuric acid

D water only

© UCLES 2011

27 Aluminium is higher than copper in the reactivity series so the following displacement reaction should be feasible.

$$2Al(s) + 3CuSO_4(aq) \rightarrow Al_2(SO_4)_3(aq) + 3Cu(s)$$

The reaction does not take place at room temperature.

What is the reason for this?

A Aluminium has an inert coating all over it.

B The compound aluminium sulfate does not exist.

C The reaction is exothermic.

D The reaction needs to be warmed to take place.

28 Scrap iron is often recycled.

Which reason for recycling is **not** correct?

A It reduces the amount of pollution at the site of the ore extraction.

B It reduces the amount of waste taken to landfill sites.

C It reduces the need to collect the scrap iron.

D It saves natural resources.

29 The gases coming from a car's exhaust contain oxides of nitrogen.

How are these oxides formed?

A Nitrogen reacts with carbon dioxide.

B Nitrogen reacts with carbon monoxide.

C Nitrogen reacts with oxygen.

D Nitrogen reacts with petrol.

30 Which element can only be extracted from its ore using electrolysis?

A calcium

B copper

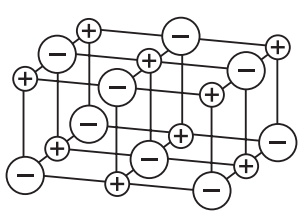
C lead

D silver

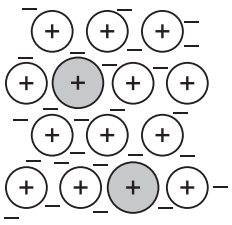
© UCLES 2011

31 Which diagram represents the structure of an alloy?

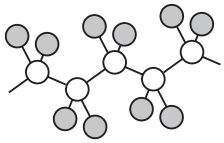
A



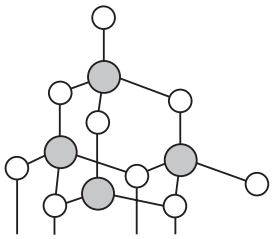
B



C



D



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

A carbon monoxide

B chlorofluorocarbons

C methane

D sulfur dioxide

33 Useful fractions are obtained by the fractional distillation of petroleum.

Which fraction is matched by its use?

	fraction	use
A	bitumen	fuel in cars
B	lubricating oils	for making waxes and polishes
C	paraffin (kerosene)	for making roads
D	petrol (gasolene)	aircraft fuel

34 Compounds X and Y are both alkanes. Compound X has a higher boiling point than compound Y.

What could be the formulae of compounds X and Y?

	compound X	compound Y
A	C_8H_{16}	C_9H_{18}
B	C_8H_{18}	C_9H_{20}
C	C_9H_{18}	C_8H_{16}
D	C_9H_{20}	C_8H_{18}

© UCLES 2011

35 Compound X is a hydrocarbon. It reacts with steam to form an alcohol.

Which type of compound is X and what would be its effect on bromine water?

	type of compound	effect on bromine water
A	alkane	turns from brown to colourless
B	alkane	turns from colourless to brown
C	alkene	turns from brown to colourless
D	alkene	turns from colourless to brown

36 Which bond is present in both nylon and *Terylene*?

A C – O **B** C = O **C** N – C **D** N – H

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

A bromine

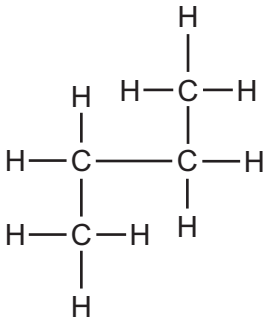
B hydrogen

C oxygen

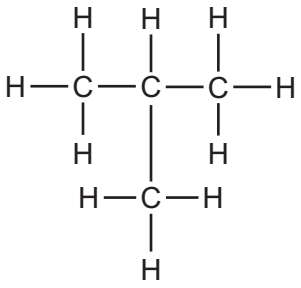
D steam

© UCLES 2011

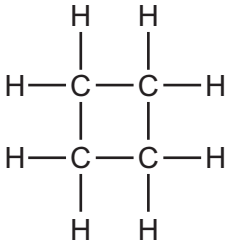
38 Four hydrocarbon structures are shown.



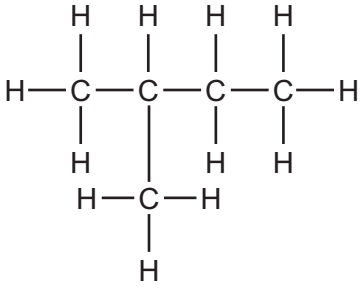
1



2



3



4

Which hydrocarbons are isomers of each other?

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

39 When a compound X is reacted with sodium carbonate, carbon dioxide gas is evolved.

What could be the formula of compound X?

A $C_2H_5CO_2CH_3$ **B** $C_3H_7CO_2H$ **C** $CH_3CO_2C_2H_5$ **D** C_4H_9OH

40 Which statement about ethanoic acid is correct?

A It contains three carbon atoms per molecule.

B It contains five hydrogen atoms per molecule.

C It is insoluble in water.

D It reacts with ethanol to form a sweet-smelling compound.

© UCLES 2011

BLANK PAGE

BLANK PAGE

BLANK PAGE

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.).

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