



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY (US)

0439/11

Paper 1 Multiple Choice

May/June 2014

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, glue or correction fluid.

Write your name, Center 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.

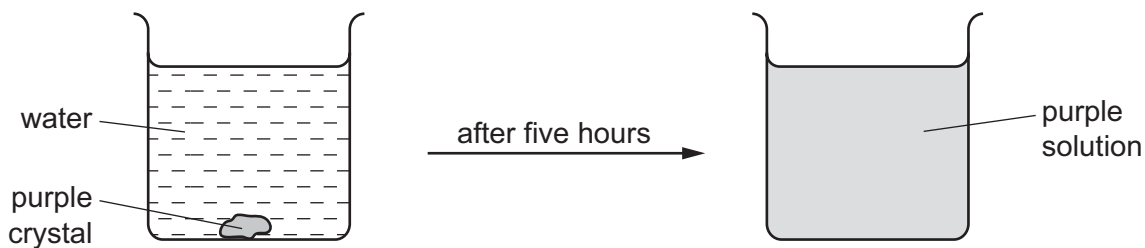
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

- 1 The diagram shows the result of dropping a purple crystal into water.



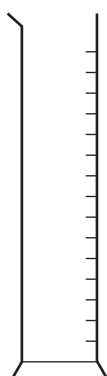
Which processes take place in this experiment?

	chemical reaction	diffusing	dissolving
A	✓	✓	✓
B	✓	x	✓
C	x	x	✓
D	x	✓	✓

- 2 The four pieces of apparatus shown below are used in chemical experiments.



buret



graduated cylinder



dropper



thermometer

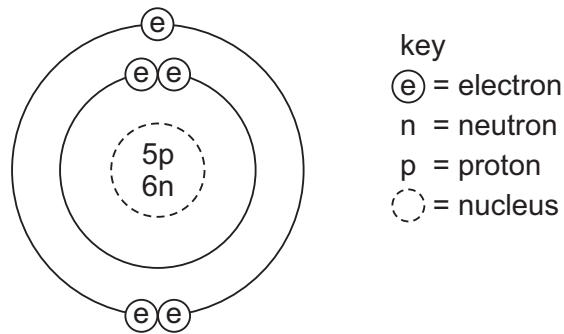
Which statement about the apparatus is correct?

- A** The buret measures the volume of liquid added in a titration.
B The graduated cylinder measures the mass of a substance used in an experiment.
C The dropper measures the volume of gas given off in a reaction.
D The thermometer measures the density of a solution.

- 3 Alcohol and water are completely miscible. This means when mixed together they form only one liquid layer.

Which method is used to separate alcohol from water?

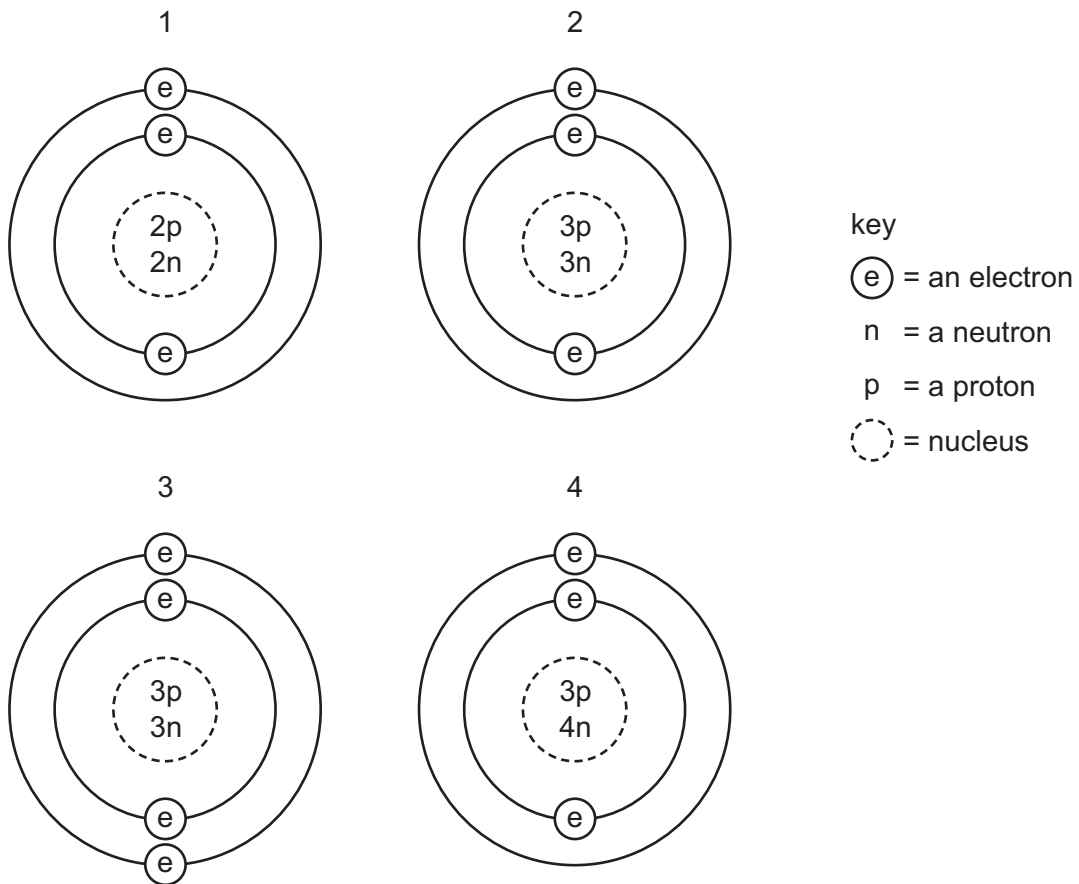
- A crystallization
 - B filtration
 - C fractional distillation
 - D precipitation
- 4 The diagram shows the structure of an atom of element X.



What is X?

- A boron
- B carbon
- C sodium
- D sulfur

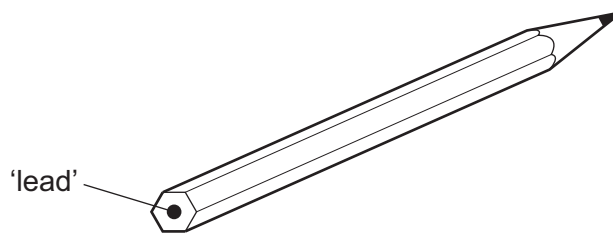
5 The diagrams show four particles.



Which two diagrams show **atoms** that are isotopes of each other?

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

6 The 'lead' in a pencil is made of a mixture of graphite and clay.



When the percentage of graphite is increased, the pencil slides across the paper more easily.

Which statement explains this observation?

- A** Graphite has a high melting point.
- B** Graphite is a form of carbon.
- C** Graphite is a lubricant.
- D** Graphite is a nonmetal.

- 7 Element X is in Group I of the Periodic Table. X reacts with element Y to form an ionic compound.

Which equation shows the process that takes place when X forms ions?

- A $X + e^{-} \rightarrow X^{+}$
 B $X - e^{-} \rightarrow X^{-}$
 C $X + e^{-} \rightarrow X^{-}$
 D $X - e^{-} \rightarrow X^{+}$

- 8 Solid F is an element.
 Solid G is a compound.
 Neither solid conducts electricity but G conducts electricity when dissolved in water.

These properties suggest that F is1..... and that G is2..... with3..... bonds.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	diamond	$AgCl$	covalent
B	diamond	$NaCl$	ionic
C	graphite	$AgCl$	ionic
D	graphite	$NaCl$	covalent

- 9 A compound contains one atom of calcium, two atoms of hydrogen and two atoms of oxygen.

What is the correct chemical formula of the compound?

- A CaO_2H_2 B $HOCaOH$ C H_2CaO_2 D $Ca(OH)_2$

- 10 In athletics, banned drugs such as nandrolone have been taken illegally to improve performance. Nandrolone has the molecular formula $C_{18}H_{26}O_2$.

What is the relative molecular mass, M_r , of nandrolone?

(Relative atomic mass: H = 1; C = 12; O = 16)

- A 46 B 150 C 274 D 306

- 11 Which substance will **not** conduct electricity?

- A aluminum
 B copper
 C plastic
 D steel

12 Which products are formed at the anode and cathode when electricity is passed through molten lead(II) bromide?

	anode (+)	cathode (-)
A	bromide ions	lead ions
B	bromine molecules	lead atoms
C	lead atoms	bromine molecules
D	lead ions	bromide ions

13 Some reactions are endothermic.

How does the temperature and energy change in an endothermic reaction?

	temperature change	energy change
A	decreases	energy taken in
B	decreases	energy given out
C	increases	energy taken in
D	increases	energy given out

14 Two chemical processes are described below.

- In the combustion of methane, energy is1..... .
- In the electrolysis of molten lead(II) bromide, energy is2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	given out	given out
B	given out	taken in
C	taken in	given out
D	taken in	taken in

15 Which equation shows an oxidation reaction?

- A** $C + O_2 \rightarrow CO_2$
- B** $CaCO_3 \rightarrow CaO + CO_2$
- C** $CaO + 2HCl \rightarrow CaCl_2 + H_2O$
- D** $N_2O_4 \rightarrow 2NO_2$

- 16 In separate experiments, a catalyst is added to a reaction mixture and the temperature of the mixture is decreased.

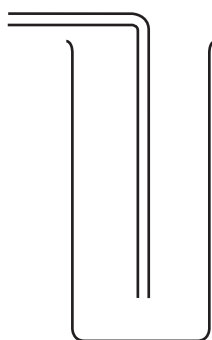
What are the effects of these changes on the rate of the reaction?

	catalyst added	temperature decreased
A	faster	faster
B	faster	slower
C	slower	faster
D	slower	slower

- 17 An experiment is carried out to investigate the rate of reaction when calcium carbonate is reacted with hydrochloric acid.

The volume of carbon dioxide gas given off is measured at different intervals of time.

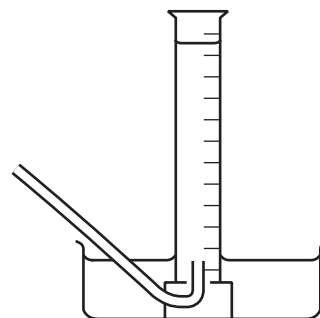
The diagram shows pieces of apparatus used to collect gases.



1
downward delivery



2
gas measuring
syringe

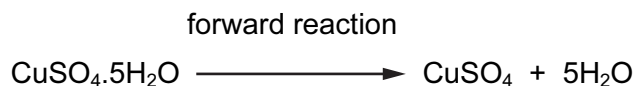


3
over water in
graduated tube

Which apparatus is suitable to collect and measure the volume of the carbon dioxide?

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

18 The equation shows a reaction that is reversed by changing the conditions.



How can the forward reaction be reversed?

	by adding water	by heating
A	✓	✓
B	✓	x
C	x	✓
D	x	x

19 Which statements about alkalis are correct?

- 1 When reacted with an acid, the pH of the alkali increases.
- 2 When tested with litmus, the litmus turns blue.
- 3 When warmed with an ammonium salt, ammonia gas is given off.

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

20 Only two elements are liquid at 20°C. One of these elements is shiny and conducts electricity.

This suggests that this element is a1..... and therefore its oxide is2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	metal	acidic
B	metal	basic
C	nonmetal	acidic
D	nonmetal	basic

21 Which acid reacts with ammonia to produce the salt ammonium sulfate?

- A** hydrochloric
- B** nitric
- C** phosphoric
- D** sulfuric

22 Aqueous sodium hydroxide is added to solid X and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

- A NH_4^+ and Fe^{2+}
- B NH_4^+ and Fe^{3+}
- C OH^- and Fe^{2+}
- D OH^- and Fe^{3+}

23 Which statement about the Periodic Table is correct?

- A Elements in the same period have the same number of outer electrons.
- B The elements on the left are usually gases.
- C The most metallic elements are on the left.
- D The relative atomic mass of the elements increases from right to left.

24 Why is argon gas used to fill electric lamps?

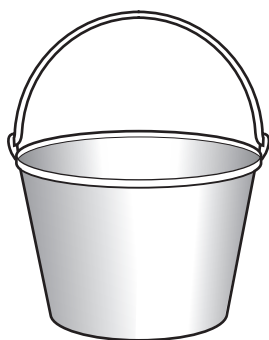
- A It conducts electricity.
- B It glows when heated.
- C It is less dense than air.
- D It is not reactive.

25 An element melts at 1455°C , has a density of 8.90 g/cm^3 and forms a green chloride.

Where in the Periodic Table is this element found?

													A
B													
												C	
													D

26 The diagrams show two items that may be found in the home. Each item contains zinc.



zinc plated bucket



brass door-knocker

In which is zinc used as an alloy?

	bucket	door-knocker
A	✓	✓
B	✓	x
C	x	✓
D	x	x

27 In an experiment, three test-tubes labeled X, Y and Z were half-filled with dilute hydrochloric acid. A different metal was added to each test-tube. After a few minutes the following observations were made.

In tube X, bubbles slowly rose to the surface.

In tube Y, there was a rapid release of bubbles.

In tube Z, no bubbles were produced.

Which three metals match the observations?

	tube X	tube Y	tube Z
A	copper	zinc	iron
B	magnesium	iron	copper
C	zinc	magnesium	copper
D	zinc	magnesium	iron

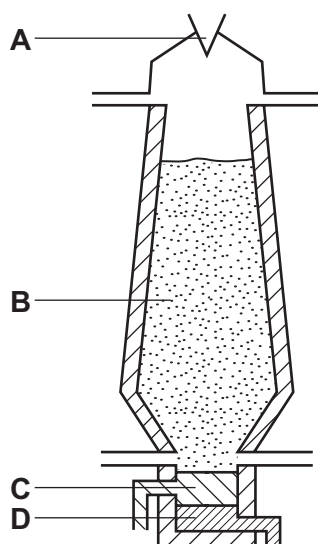
28 The table shows properties of four metals.

Which metal is the most suitable for aircraft construction?

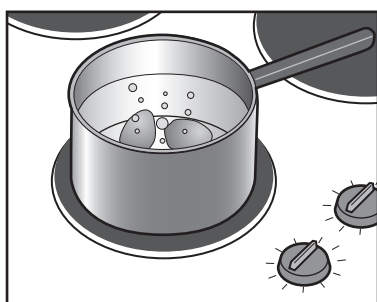
	density	strength	resistance to corrosion
A	high	high	low
B	high	low	low
C	low	high	high
D	low	low	high

29 The diagram shows a blast furnace.

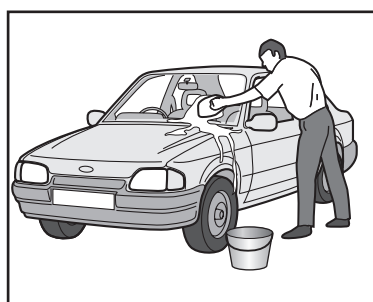
In which part is iron ore changed to iron?



30 The diagram shows some uses of water in the home.



1



2



3

For which uses is it important for the water to have been treated?

A 1 only

B 2 only

C 3 only

D 1, 2 and 3

31 Four steel paper clips are treated as described before being placed in a beaker of water.

Which paper clip rusts most quickly?

- A coated with grease
- B dipped in paint and allowed to dry
- C electroplated with zinc
- D washed with soap and rinsed

32 Which compound contains two of the three essential elements needed for a complete fertiliser?

- A ammonium chloride
- B ammonium nitrate
- C ammonium phosphate
- D ammonium sulfate

33 When compound X is heated, it changes colour from green to black. Compound Y is formed and a gas is given off which turns limewater milky.

What are X and Y?

	X	Y
A	calcium carbonate	calcium oxide
B	copper carbonate	carbon
C	copper carbonate	copper oxide
D	copper sulfate	copper oxide

34 Acid rain is formed when sulfur dioxide and oxides of nitrogen dissolve in rain water.

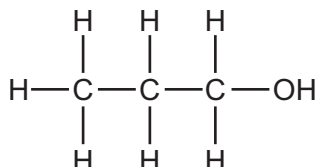
Which problem is **not** caused by acid rain?

- A breathing difficulties
- B dying trees
- C erosion of statues
- D lowered pH of lakes

35 Which pollutant gas is produced by the decomposition of vegetation?

- A carbon monoxide
- B methane
- C nitrogen oxide
- D sulfur dioxide

36 Which type of compound is shown?



- A alcohol
- B alkane
- C alkene
- D carboxylic acid

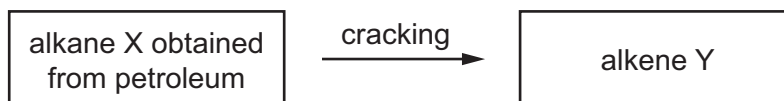
37 The table shows the composition of four different types of petroleum (crude oil).

fraction	Arabian Heavy / %	Arabian Light / %	Iranian Heavy / %	North Sea / %
gasoline	18	21	21	23
kerosene	11.5	13	13	15
diesel oil	18	20	20	24
fuel oil	52.5	46	46	38

Which type of petroleum is best for the motor vehicle industry?

- A Arabian Heavy
- B Arabian Light
- C Iranian Heavy
- D North Sea

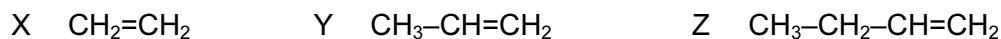
38 Alkenes are manufactured by cracking hydrocarbons obtained from petroleum.



Which row describes the process of cracking?

	size of X molecules	size of Y molecules	catalyst required	temperature required
A	large	small	no	low
B	large	small	yes	high
C	small	large	no	low
D	small	large	yes	high

39 X, Y and Z are three hydrocarbons.



What do compounds X, Y and Z have in common?

- 1 They are all alkenes.
- 2 They are all part of the same homologous series.
- 3 They all have the same boiling point.

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

40 Which statements about ethanol are correct?

- 1 It can be made by fermentation.
- 2 It is an unsaturated compound.
- 3 It burns in air and can be used as a fuel.

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

DATA SHEET
The Periodic Table of the Elements

		Group										
		I	II	III	IV	V	VI	VII	VIII	IX	X	0
		1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											19 F Fluorine 9
23 Na Sodium 11	24 Mg Magnesium 12	11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18	20 Ne Neon 10	35.5 Br Bromine 35	40 Kr Krypton 36
39 K Potassium 19	40 Ca Calcium 20	27 Fe Iron 26	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	52 Te Tellurium 52	54 Xe Xenon 54
85 Rb Rubidium 37	88 Sr Strontium 38	55 Mn Manganese 25	56 Fe Iron 26	57 Co Cobalt 27	58 Ni Nickel 28	59 Cu Copper 29	60 Zn Zinc 30	61 Ga Gallium 31	62 Ge Germanium 32	63 As Arsenic 33	64 Se Selenium 34	65 Br Bromine 35
133 Cs Caesium 55	137 Ba Barium 56	91 Zr Zirconium 40	92 Nb Niobium 41	93 Mo Molybdenum 42	94 Tc Technetium 43	95 Ru Ruthenium 44	96 Rh Rhodium 45	97 Pd Palladium 46	98 Ag Silver 47	99 Cd Cadmium 48	100 In Indium 49	101 Sn Tin 50
226 Ra Radium 88	227 Ac Actinium 89	106 Pt Platinum 78	107 Au Gold 79	108 Hg Mercury 80	109 Tl Thallium 81	110 Pb Lead 82	111 Bi Bismuth 83	112 Po Polonium 84	113 At Astatine 85	114 Rn Radon 86	127 I Iodine 53	128 Xe Xenon 54
*58-71 Lanthanoid series †90-103 Actinoid series												
140 Ce Cerium 58	141 Pr Praseodymium 59	142 Nd Neodymium 60	143 Pm Promethium 61	144 Sm Samarium 62	145 Eu Europium 63	146 Gd Gadolinium 64	147 Tb Terbium 65	148 Dy Dysprosium 66	149 Ho Holmium 67	150 Er Erbium 68	151 Tm Thulium 69	152 Yb Ytterbium 70
232 Th Thorium 90	233 Pa Protactinium 91	234 U Uranium 92	235 Np Neptunium 93	236 Pu Plutonium 94	237 Am Americium 95	238 Cm Curium 96	239 Bk Berkelium 97	240 Cf Californium 98	241 Es Einsteinium 99	242 Fm Fermium 100	243 Md Mendelevium 101	244 No Nobelium 102

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

	a	X	a = relative atomic mass
Key	X	b	X = atomic symbol
			b = proton (atomic) number

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