Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY (US) **0439/11**

Paper 1 Multiple Choice **October/November 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 **13** printed pages and **3** blank pages.

1 Which statement is an example of diffusion?

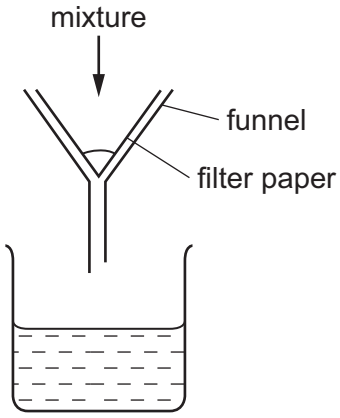
A A kitchen towel soaks up some spilled milk.

B Ice cream melts in a warm room.

C Pollen from flowers is blown by the wind.

D The smell of cooking spreads through a house.

2 A mixture is separated using the apparatus shown.



What is the mixture?

A aqueous copper chloride and copper

B aqueous copper chloride and sodium chloride

C ethane and methane

D ethanol and water

3 Ethanol is made by fermentation.

How is ethanol obtained from the fermentation mixture?

A chromatography

B crystallization

C electrolysis

D fractional distillation

4 What is different for isotopes of the same element?

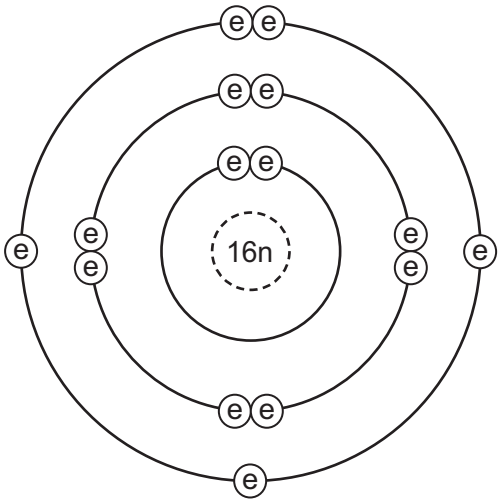
A nucleon number

B number of electron shells

C number of electrons in the outer shell

D proton number

5 Which element has the atomic structure shown?



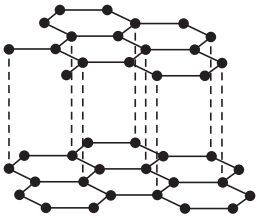
key
e electron
n neutron
nucleus

A A*l* **B** P **C** S **D** Si

6 Slate has a layered structure and can easily be split into thin sheets.

Which diagram shows a structure most like that of slate?

A



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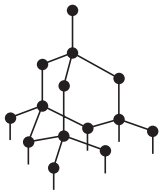

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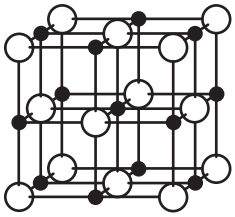

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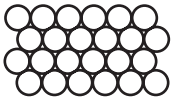


7 Sodium chloride is an ionic solid.

Which statement is **not** correct?

A Ions are formed when atoms lose or gain electrons.

B Ions in sodium chloride are strongly held together.

C Ions with the same charge attract each other.

D Sodium chloride solution can conduct electricity.

8 Caesium chloride and rubidium bromide are halide compounds of Group I elements.

Caesium chloride has the formula ……1……, a relative formula mass ……2…… that of rubidium bromide and bonds that are ……3…… .

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	CaC*l*	different from	ionic
B	CaC*l*	the same as	covalent
C	CsC*l*	different from	ionic
D	CsC*l*	the same as	covalent

9 How many atoms of hydrogen are there in a molecule of ethanol, C_2H_5OH?

A 1 **B** 2 **C** 5 **D** 6

10 Iron forms an oxide with the formula Fe_2O_3.

What is the relative formula mass of this compound?

A 76 **B** 100 **C** 136 **D** 160

11 Which metal could **not** be used for electroplating by using an aqueous solution?

A chromium

B copper

C silver

D sodium

12 Which products are formed at the electrodes when a concentrated solution of sodium chloride is electrolyzed?

	cathode (–)	anode (+)
A	hydrogen	chlorine
B	hydrogen	oxygen
C	sodium	chlorine
D	sodium	oxygen

13 Which statements about exothermic and endothermic reactions are correct?

1 During an exothermic reaction, heat is given out.

2 The temperature of an endothermic reaction goes up because heat is taken in.

3 Burning methane in the air is an exothermic reaction.

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

14 A power station was designed to burn gaseous fuels only.

Which two substances could be used?

A carbon dioxide and hydrogen

B carbon dioxide and ^{235}U

C hydrogen and methane

D methane and ^{235}U

15 The rate of a reaction depends on temperature, concentration, particle size and catalysts.

Which statement is **not** correct?

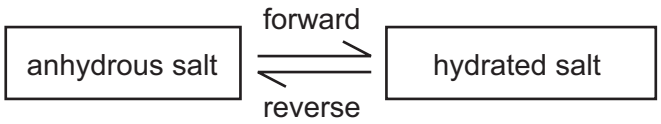
A Catalysts can be used to increase the rate of reaction.

B Higher concentration decreases the rate of reaction.

C Higher temperature increases the rate of reaction.

D Larger particle size decreases the rate of reaction.

16 The diagram shows the change from an anhydrous salt to its hydrated form.



Which statement is correct?

A forward reaction requires heat and water

B forward reaction requires water only

C reverse reaction requires heat and water

D reverse reaction requires water only

17 The equations for two reactions P and Q are given.

P $2\underline{NaNO_2} + O_2 \rightarrow 2NaNO_3$

Q $2\underline{HgO} \rightarrow 2Hg + O_2$

In which of these reactions does oxidation of the underlined substance occur?

	P	Q
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

18 Which changes decrease the rate of reaction between magnesium and air?

1 heating the magnesium to a higher temperature

2 using a higher proportion of oxygen in the air

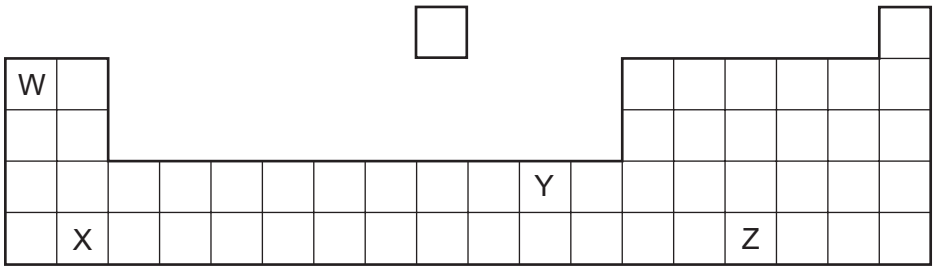
3 using magnesium ribbon instead of powdered magnesium

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

19 Which substance is the most acidic?

	substance	pH
A	calcium hydroxide	12
B	lemon juice	4
C	milk	6
D	washing up liquid	8

20 The positions of elements W, X, Y and Z in the Periodic Table are shown.



Which elements form basic oxides?

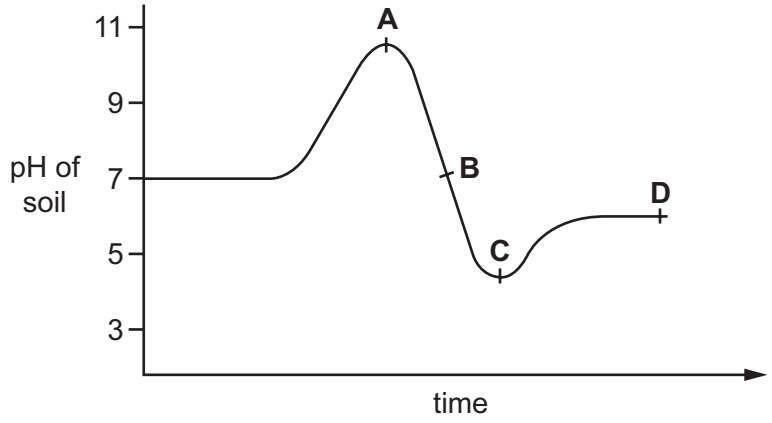
A W, X and Y **B** W and X only **C** Y only **D** Z only

21 How many different salts could be made from a supply of dilute sulfuric acid, dilute hydrochloric acid, copper, magnesium oxide and zinc carbonate?

A 3 **B** 4 **C** 5 **D** 6

22 The graph shows how the pH of soil in a field changes over time.

At which point was the soil neutral?



23 Elements in Group I of the Periodic Table react with water.

Which row describes the products made in the reaction and the trend in reactivity of the elements?

	products	trend in reactivity
A	metal hydroxide and hydrogen	less reactive down the group
B	metal hydroxide and hydrogen	more reactive down the group
C	metal oxide and hydrogen	less reactive down the group
D	metal oxide and hydrogen	more reactive down the group

24 An element X has the two properties listed.

1 It acts as a catalyst.

2 It forms colorless ions.

Which of these properties suggest that X is a transition element?

	property 1	property 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

25 An inert gas X is used to fill weather balloons.

Which descriptions of X are correct?

	number of outer electrons in atoms of X	structure of gas X
A	2	single atoms
B	2	diatomic molecules
C	8	single atoms
D	8	diatomic molecules

26 The table shows the reactions of four different metals with water.

metal	reaction
W	reacts vigorously with cold water
X	no reaction with water
Y	reacts very slowly with water, more vigorously with steam
Z	reacts violently with cold water

What is the correct order of reactivity, from most reactive to least reactive?

A $W \rightarrow X \rightarrow Y \rightarrow Z$

B $W \rightarrow Z \rightarrow Y \rightarrow X$

C $Z \rightarrow W \rightarrow X \rightarrow Y$

D $Z \rightarrow W \rightarrow Y \rightarrow X$

27 Which information about an element can be used to predict its chemical properties?

A boiling point

B density

C melting point

D position in the Periodic Table

28 Aluminum is the most common metal in the Earth's crust.

Which is **not** a property of aluminum?

A low density

B resistance to corrosion

C good conductor of electricity

D poor conductor of heat

29 The oxide of element X is reduced by heating with carbon.

Element X does not react with cold water, steam or dilute hydrochloric acid.

What is X?

A copper

B iron

C magnesium

D zinc

30 Which object is **least** likely to contain aluminum?

A a bicycle frame

B a hammer

C a saucepan

D an aeroplane body

31 Which reaction involves oxidation?

A heating hydrated copper(II) sulfate in the air

B polymerization of ethene

C rusting of iron

D thermal decomposition of calcium carbonate

32 Which method can be used to obtain ammonia from ammonium sulfate?

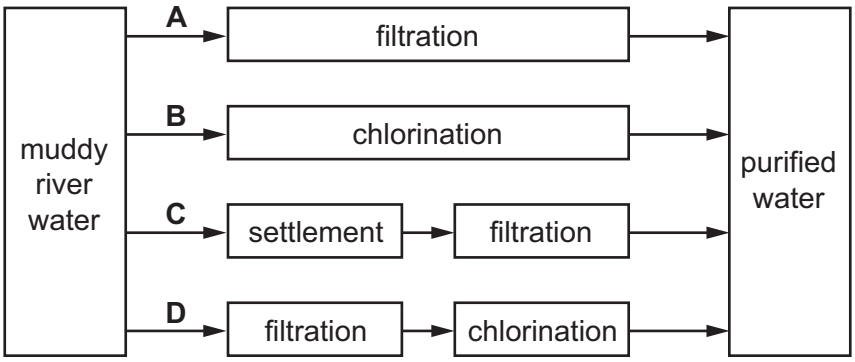
A Heat it with an acid.

B Heat it with an alkali.

C Heat it with an oxidizing agent.

D Heat it with a reducing agent.

33 Which method of purification would produce water **most** suitable for drinking?



34 Which statement about methane is **not** correct?

A It is a liquid produced by distilling petroleum.

B It is produced as vegetation decomposes.

C It is produced by animals, such as cows.

D It is used as a fuel.

35 Which is an air pollutant that affects a part of the body other than the lungs and blood system?

A lead compounds

B nitrogen

C oxides of nitrogen

D sulfur dioxide

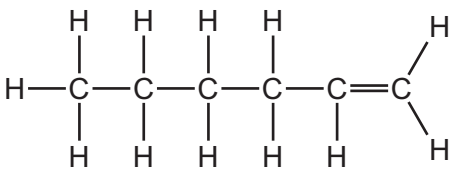
36 Increasing the number of atoms in one molecule of a hydrocarbon increases the amount of energy released when it burns.

What is the correct order?

	less energy released →		more energy released
A	ethene	ethane	methane
B	ethene	methane	ethane
C	methane	ethane	ethene
D	methane	ethene	ethane

37 Which molecular structure shows hexene?

A



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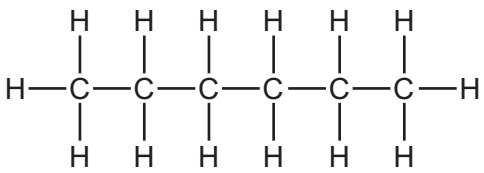

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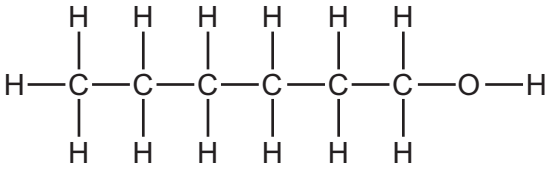

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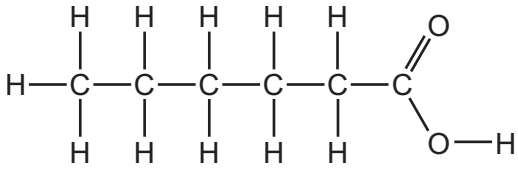
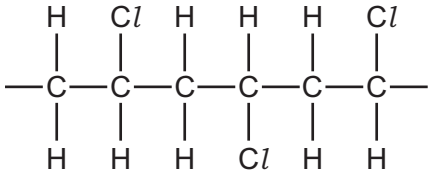
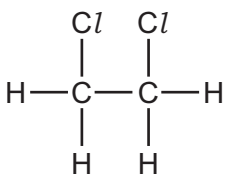


38 The diagram shows three repeat units in the structure of an addition polymer.



Which alkene monomer is used to make this polymer?

A



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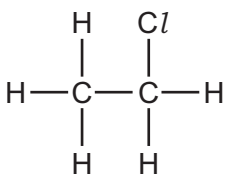

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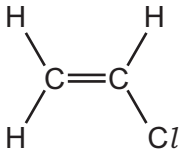

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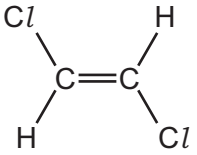

39 Which statement about alkenes is **not** correct?

A The functional group is C=C.

B The structural difference between one member and the next is $-CH_3-$.

C They form a homologous series.

D They turn aqueous bromine from brown to colorless.

40 Ethanol can be manufactured from substance X.

$$\text{substance X} + \text{steam} \xrightarrow{\text{catalyst}} \text{ethanol}$$

What is substance X?

A carbon dioxide

B ethene

C hydrogen

D oxygen

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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											
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** Aluminum 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.).