

**CHEMISTRY (US)**

**0439/13**

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)

\* 2 0 0 7 6 4 4 5 5 9 6 \*

**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.

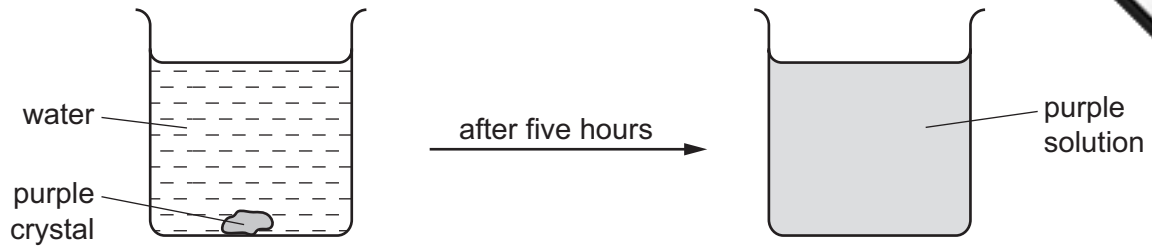
Any rough working should be done in this booklet.

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
<b>A</b>	✓	✓	✓
<b>B</b>	✓	x	✓
<b>C</b>	x	x	✓
<b>D</b>	x	✓	✓

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

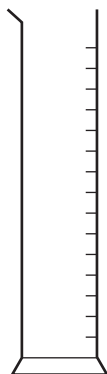
Which method is used to separate alcohol from water?

- A** crystallization
- B** filtration
- C** fractional distillation
- D** precipitation

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



buret

graduated  
cylinder

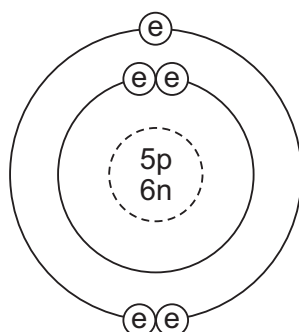
dropper



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.
- 4 The diagram shows the structure of an atom of element X.



key

⊙ = electron

n = neutron

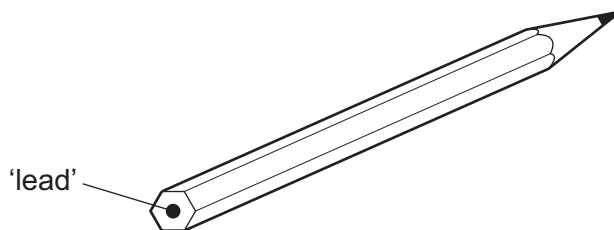
p = proton

⊖ = nucleus

What is X?

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

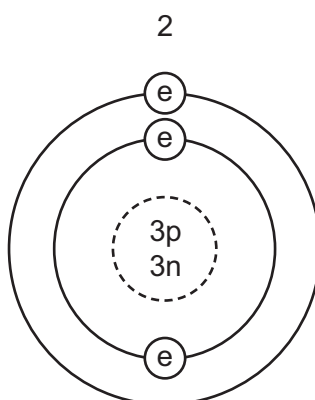
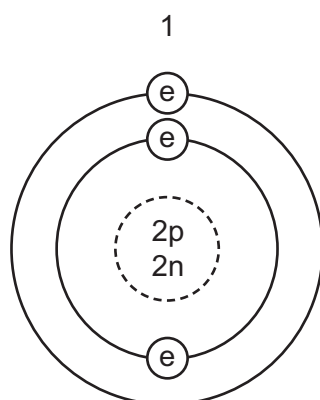
- 5 The 'lead' in a pencil is made of a mixture of graphite and clay.



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.
- 6 The diagrams show four particles.



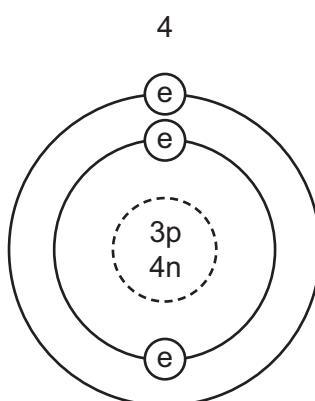
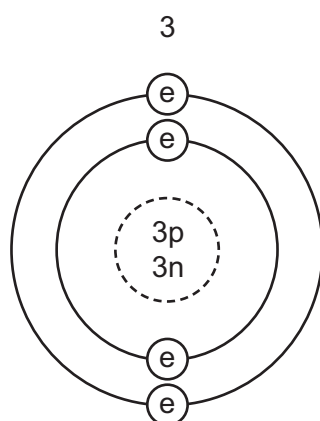
key

⊙ = an electron

n = a neutron

p = a proton

⊙ = nucleus



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

- 7 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 is .....1..... and that G is .....2..... with .....3..... bonds.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
<b>A</b>	diamond	$AgCl$	covalent
<b>B</b>	diamond	$NaCl$	ionic
<b>C</b>	graphite	$AgCl$	ionic
<b>D</b>	graphite	$NaCl$	covalent

- 8 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
- 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 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**  $X - e^- \rightarrow X^+$
- 11 Which substance will **not** conduct electricity?
- A** aluminum
- B** copper
- C** plastic
- D** steel

12 Two chemical processes are described below.

- In the combustion of methane, energy is .....1..... .
- In the electrolysis of molten lead(II) bromide, energy is .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	given out	given out
<b>B</b>	given out	taken in
<b>C</b>	taken in	given out
<b>D</b>	taken in	taken in

13 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**  $N_2O_4 \rightarrow 2NO_2$

14 Some reactions are endothermic.

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

	temperature change	energy change
<b>A</b>	decreases	energy taken in
<b>B</b>	decreases	energy given out
<b>C</b>	increases	energy taken in
<b>D</b>	increases	energy given out

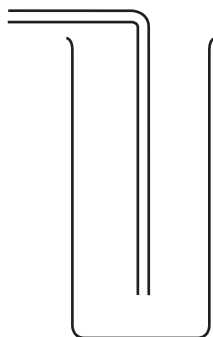
15 Which products are formed at the anode and cathode when electricity is passed through molten lead(II) bromide?

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

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

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

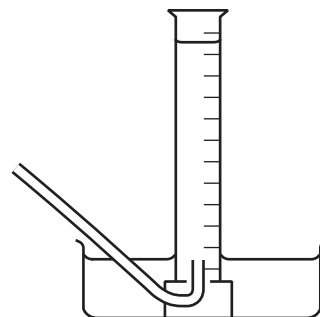
The diagram shows pieces of apparatus used to collect gases.



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
- 17 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
<b>A</b>	faster	faster
<b>B</b>	faster	slower
<b>C</b>	slower	faster
<b>D</b>	slower	slower

- 18 Which statements about alkalis are correct?

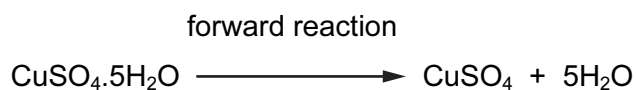
- 1 When reacted with an acid, the pH of the alkali increases.
- 2 When tested with litmus, the litmus turns blue.
- 3 When warmed with an ammonium salt, ammonia gas is given off.

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

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

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

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



How can the forward reaction be reversed?

	by adding water	by heating
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

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

This suggests that this element is a .....1..... and therefore its oxide is .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	metal	acidic
<b>B</b>	metal	basic
<b>C</b>	nonmetal	acidic
<b>D</b>	nonmetal	basic





- 26 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.

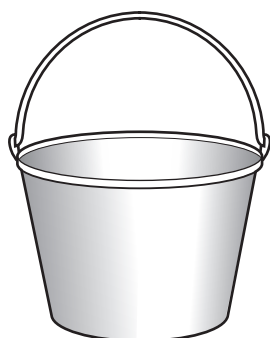
In tube Y, there was a rapid release of bubbles.

In tube Z, no bubbles were produced.

Which three metals match the observations?

	tube X	tube Y	tube Z
<b>A</b>	copper	zinc	iron
<b>B</b>	magnesium	iron	copper
<b>C</b>	zinc	magnesium	copper
<b>D</b>	zinc	magnesium	iron

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



zinc plated bucket

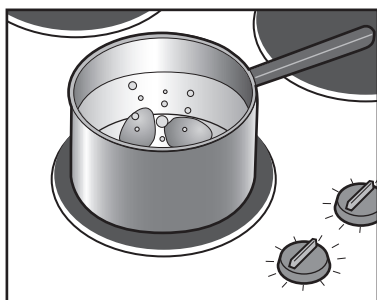


brass door-knocker

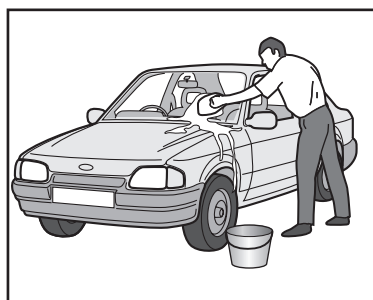
In which is zinc used as an alloy?

	bucket	door-knocker
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

28 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

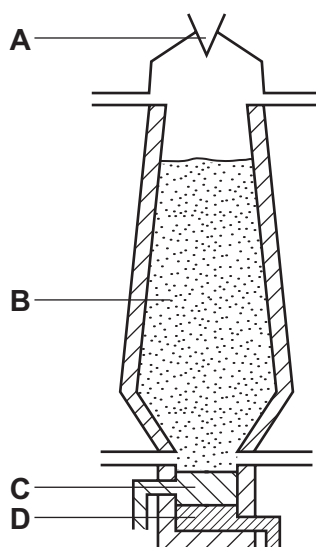
29 The table shows properties of four metals.

Which metal is the most suitable for aircraft construction?

	density	strength	resistance to corrosion
<b>A</b>	high	high	low
<b>B</b>	high	low	low
<b>C</b>	low	high	high
<b>D</b>	low	low	high

30 The diagram shows a blast furnace.

In which part is iron ore changed to iron?



31 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

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

Which paper clip rusts most quickly?

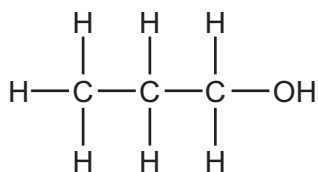
- A coated with grease
- B dipped in paint and allowed to dry
- C electroplated with zinc
- D washed with soap and rinsed

34 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

35 Which type of compound is shown?



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

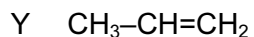
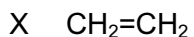
36 The table shows the composition of four different types of petroleum (crude oil).

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
- 37 Which pollutant gas is produced by the decomposition of vegetation?
- A carbon monoxide
  - B methane
  - C nitrogen oxide
  - D sulfur dioxide

38 X, Y and Z are three hydrocarbons.

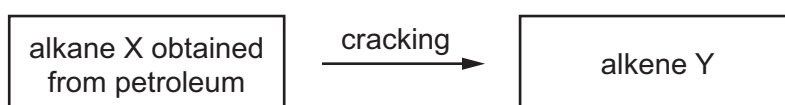


What do compounds X, Y and Z have in common?

- 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

39 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
<b>A</b>	large	small	no	low
<b>B</b>	large	small	yes	high
<b>C</b>	small	large	no	low
<b>D</b>	small	large	yes	high

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	0										
1 <b>H</b> Hydrogen 1											2 <b>He</b> Helium 2						
3 <b>Li</b> Lithium 4	9 <b>Be</b> Beryllium 4											10 <b>Ne</b> Neon 10					
11 <b>Na</b> Sodium 11	12 <b>Mg</b> Magnesium 12	13 <b>Al</b> Aluminum 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulfur 16	17 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18										
19 <b>K</b> Potassium 19	20 <b>Ca</b> Calcium 20	21 <b>Sc</b> Scandium 21	22 <b>Ti</b> Titanium 22	23 <b>V</b> Vanadium 23	24 <b>Cr</b> Chromium 24	25 <b>Mn</b> Manganese 25	26 <b>Fe</b> Iron 26	27 <b>Co</b> Cobalt 27	28 <b>Ni</b> Nickel 28	29 <b>Cu</b> Copper 29	30 <b>Zn</b> Zinc 30	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36
37 <b>Rb</b> Rubidium 37	38 <b>Sr</b> Strontium 38	39 <b>Y</b> Yttrium 39	40 <b>Zr</b> Zirconium 40	41 <b>Nb</b> Niobium 41	42 <b>Mo</b> Molybdenum 42	43 <b>Tc</b> Technetium 43	44 <b>Ru</b> Ruthenium 44	45 <b>Rh</b> Rhodium 45	46 <b>Pd</b> Palladium 46	47 <b>Ag</b> Silver 47	48 <b>Cd</b> Cadmium 48	49 <b>In</b> Indium 49	50 <b>Sn</b> Tin 50	51 <b>Sb</b> Antimony 51	52 <b>Te</b> Tellurium 52	53 <b>I</b> Iodine 53	54 <b>Xe</b> Xenon 54
55 <b>Cs</b> Caesium 55	56 <b>Ba</b> Barium 56	57 <b>La</b> Lanthanum 57	72 <b>Hf</b> Hafnium 72	73 <b>Ta</b> Tantalum 73	74 <b>W</b> Tungsten 74	75 <b>Re</b> Rhenium 75	76 <b>Os</b> Osmium 76	77 <b>Ir</b> Iridium 77	78 <b>Pt</b> Platinum 78	79 <b>Au</b> Gold 79	80 <b>Hg</b> Mercury 80	81 <b>Tl</b> Thallium 81	82 <b>Pb</b> Lead 82	83 <b>Bi</b> Bismuth 83	84 <b>Po</b> Polonium 84	85 <b>At</b> Astatine 85	86 <b>Rn</b> Radon 86
87 <b>Fr</b> Francium 87	88 <b>Ra</b> Radium 88	89 <b>Ac</b> Actinium 89															

140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	91 <b>Pa</b> Protactinium 91	94 <b>Pu</b> Plutonium 94	95 <b>Am</b> Americium 95	96 <b>Cm</b> Curium 96	97 <b>Bk</b> Berkelium 97	98 <b>Cf</b> Californium 98	99 <b>Es</b> Einsteinium 99	100 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103

\*58-71 Lanthanoid series  
†90-103 Actinoid series

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

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

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