

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

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CHEMISTRY (US) 0439/13

Paper 1 Multiple Choice May/June 2015

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.



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1 A sugar cube is dropped into a hot cup of tea.

The tea is not stirred.

Which statement explains why the tea becomes sweet?

- A The heated water molecules penetrate the sugar cube.
- **B** The hot tea causes the sugar to melt.0
- **C** The sugar cube dissolves and its molecules diffuse.
- **D** The sugar molecules get hot and evaporate.
- 2 A blue solid, X, is soluble in water.

Which method is used to obtain pure solid X from an aqueous solution?

- A chromatography
- **B** crystallization
- **C** filtration
- **D** neutralization
- **3** Two atoms, X and Y, can be represented as shown.

Which statement is **not** correct?

- **A** X and Y are atoms of different elements.
- **B** X and Y are isotopes.
- **C** X and Y have different mass numbers.
- **D** X and Y have the same number of electrons.
- 4 Two atoms have the same relative atomic mass but different chemical properties.

Which row about the proton and neutron numbers of these atoms is correct?

	proton numbers	neutron numbers
Α	different	different
В	different	same
С	same	different
D	same	same

www.PapaCambridge.com 5 Which statements comparing the properties of electrons, neutrons and protons are co

	neutrons and protons are both heavier than electrons	only electrons and neutrons are charged
Α	✓	✓
В	✓	X
С	X	✓
D	X	X

Diamond and graphite are both macromolecules.

Which statement is **not** correct?

- Diamond and graphite contain carbon atoms only.
- Diamond and graphite contain charged ions. В
- C Diamond and graphite have high melting points.
- The atoms in diamond and graphite are held together by covalent bonds.
- 7 In which compounds are pairs of electrons shared between atoms?
 - 1 methane
 - lead bromide
 - sodium chloride
 - **B** 2 only 1 only **C** 1 and 3 **D** 1, 2 and 3
- 8 Aluminum oxide has the formula Al_2O_3 .

Which statement about aluminum oxide is correct?

- **A** 2g of aluminum atoms are combined with 3g of oxygen atoms.
- 2g of aluminum atoms are combined with 3g of oxygen molecules. В
- **C** Aluminum oxide has a relative molecular mass of 102.
- Pure aluminum oxide contains a higher mass of oxygen than of aluminum.

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9 Copper and hydrogen can each be formed by electrolysis.

At which electrodes are these elements formed?

	copper	hydrogen
Α	anode	anode
В	anode	cathode
С	cathode	anode
D	cathode	cathode

10 An object is electroplated with silver using an aqueous silver salt as the electrolyte.

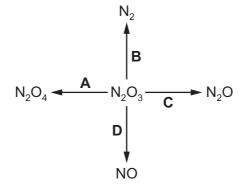
Which set of conditions is used?

	the object to be electroplated is the	the other electrode is made from
Α	anode	carbon
В	anode	silver
С	cathode	carbon
D	cathode	silver

11 Which substance does **not** use oxygen to produce energy?

- A coal
- **B** hydrogen
- C natural gas
- **D** uranium

12 In which change is N_2O_3 oxidized?



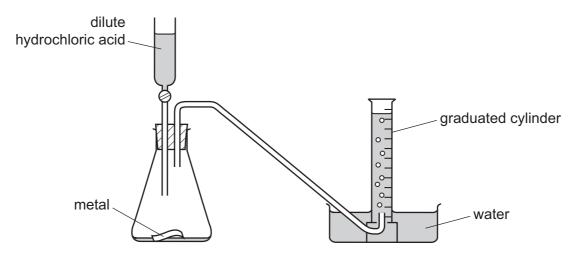
www.papaCambridge.com 13 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colo changes to blue.

$$CoCl_2.6H_2O \rightleftharpoons CoCl_2 + 6H_2O$$

What happens when water is added to the blue solid?

	color	temperature
Α	changes to pink	decreases
В	changes to pink	increases
С	remains blue	decreases
D	remains blue	increases

14 The diagram shows an experiment to measure the rate of a chemical reaction.



Which change decreases the rate of reaction?

- adding water to the flask Α
- В heating the flask during the reaction
- C using more concentrated acid
- using powdered metal
- **15** Which reaction is **not** characteristic of an acid?
 - Α It dissolves magnesium oxide.
 - В It produces ammonia from ammonium compounds.
 - C It produces carbon dioxide from a carbonate.
 - D It produces hydrogen from zinc metal.

Thand water.

16 Hydrochloric acid is used to clean metals.

The acid reacts with the oxide layer on the surface of the metal, forming a salt and water.

Which word describes the metal oxide?

- A alloy
- **B** base
- C element
- **D** indicator
- 17 Which of the following methods are suitable for preparing both zinc sulfate and copper sulfate?
 - 1 Reacting the metal oxide with warm dilute aqueous sulfuric acid.
 - 2 Reacting the metal with dilute aqueous sulfuric acid.
 - 3 Reacting the metal carbonate with dilute aqueous sulfuric acid.
 - A 1 and 2 only
 - B 1 and 3 only
 - C 2 and 3 only
 - **D** 1, 2 and 3
- 18 Which gas relights a glowing splint?
 - A ammonia
 - B carbon dioxide
 - C hydrogen
 - **D** oxygen
- 19 The noble gases, which are in Group 0 of the Periodic Table, are all very 1.......

......2......, one of these gases, is used to provide an inert atmosphere in lamps.

Another, 3......, is used for filling balloons because it is less dense than air.

Which words complete the sentences about noble gases?

	1	2	3
Α	reactive	argon	helium
В	reactive	helium	argon
С	unreactive	argon	helium
D	unreactive	helium	argon

Which Table		e element titanium, Ti,	7 can be predicted	from its position	N. Papa Cambridge Com
	can be used as a catalyst	conducts electricity when solid	has low density	forms colored compounds	The Con
Α	✓	✓	✓	X	13
В	✓	✓	X	✓	
С	✓	×	✓	✓	L
D	X	✓	✓	✓	

21 X is a Group I metal.

Y and Z are Group VII elements.

When X reacts with Y a salt is formed. A solution of this salt reacts with Z to form a different salt.

What are X, Y and Z?

	X	Y	Z
Α	K	Cl_2	I_2
В	Li	Cl_2	Br ₂
С	Mg	Br_2	Cl_2
D	Na	I_2	Cl_2

22 In the outline of the Periodic Table below, some elements are shown as numbers.

							1	2		
3								4		
5	6									
							7			

Which two numbers are **metals** in the same period?

A 1 and 2

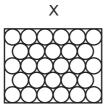
B 1 and 7

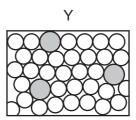
C 3 and 5

D 5 and 6

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www.PapaCambridge.com 23 The diagrams show the structure of two substances used to make electrical conductor





Which statement correctly describes X and Y?

- X is a pure metal and Y is a compound.
- В X is a pure metal and Y is an alloy.
- **C** X is a solid and Y is a liquid.
- **D** X is harder and stronger than Y.
- 24 Which statement about the uses of aluminum, mild steel and stainless steel is correct?
 - A Aluminum is used for food containers as it has a high density.
 - В Mild steel is used for car bodies as it is resistant to corrosion.
 - **C** Stainless steel is used for aircraft bodies as it is strong.
 - D Stainless steel is used for cutlery as it is resistant to corrosion.
- 25 Which row describes the conditions used to make steel from the iron produced by a blast furnace?

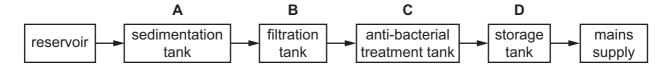
	calcium oxide (lime)	oxygen	heat
Α	✓	✓	✓
В	✓	✓	X
С	x	✓	✓
D	x	✓	x

- 26 The statements describe how different metals react with cold water.
 - Calcium sinks, fizzing and releasing a steady stream of hydrogen.
 - Copper does not react.
 - Sodium floats, fizzing and rapidly releasing hydrogen.
- www.PapaCambridge.com Zinc does not react but does react with steam, releasing hydrogen.

Using the information, where should hydrogen be placed in the reactivity series?

- Α below copper
- between sodium and calcium В
- C between calcium and zinc
- **D** between zinc and copper
- **27** The diagram shows stages in producing drinking water.

In which tank is chlorine added to the water?



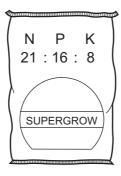
28 Oxygen is a reactive element.

Which row shows which of oxygen's reactions are useful?

	fuel combustion	rusting	steel manufacture
Α	no	no	yes
В	no	yes	no
С	yes	no	yes
D	yes	yes	no

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www.PapaCambridge.com 29 Which combination of chemical compounds could be used to produce the fertilizer sh



- **A** $(NH_4)_3PO_4$, KCl
- **B** NH_4NO_3 , $Ca_3(PO_4)_2$
- \mathbf{C} NH₄NO₃, CO(NH₂)₂
- **D** NH₄NO₃, K₂SO₄, (NH₄)₂SO₄
- 30 Below are two statements about sulfur dioxide.
 - Sulfur dioxide is formed when fossil fuels burn and it is an acidic oxide.
 - 2 Sulfur dioxide is one of the gases in the air which is responsible for 'acid rain'.

Which is correct?

- Both statements are correct and statement 1 explains statement 2.
- В Both statements are correct but statement 1 does not explain statement 2.
- C Statement 1 is correct but statement 2 is incorrect.
- Statement 2 is correct but statement 1 is incorrect.
- **31** Which method is **not** used for rust prevention?
 - A coating working parts of industrial machinery with oil
 - **B** covering wire for gardening use with plastic
 - C immersing gardening tools in water for storage
 - painting car bodies D
- 32 Carbon dioxide and methane are 'greenhouse gases' which contribute to global warming.

Which process does **not** increase global warming?

- A burning fossil fuels
- B decay of organic waste
- C farming cattle for beef
- growing crops such as sugar cane

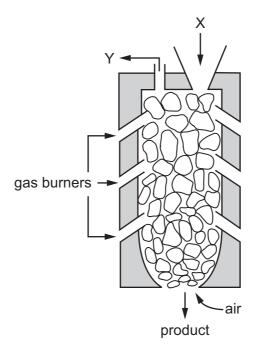
- 33 Four reactions produce carbon dioxide.
 - 1 respiration
 - 2 fermentation
 - 3 combustion of methane
 - 4 manufacture of lime

Which reactions do not use oxygen from the air?

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

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34 The diagram shows a kiln used to manufacture lime.



Which row identifies X and Y?

	X	Y
Α	lime	carbon dioxide
В	lime	steam
С	limestone	carbon dioxide
D	limestone	steam

- 35 Which statement about the names of organic compounds is correct?
 - A Compounds containing C=C double bonds are alkanes.
 - **B** The compound of formula CH₃CO₂H is methanoic acid.
 - **C** The compound of formula C_2H_4 is ethane.
 - **D** The compound of formula C_2H_5OH is an alcohol.

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- A It can be separated into useful substances by fractional distillation.
- **B** It consists mainly of hydrocarbons.
- **C** It is found underground in many parts of the world.
- **D** Its main use is for making lubricants and polishes.
- 37 Ethene, propene and butene are all members of the same homologous series.

Which statement explains why ethene, propene and butene have similar chemical properties?

- **A** They all have the same functional group.
- **B** They are all gases at room temperature.
- **C** They are all hydrocarbons.
- **D** They are all organic.
- 38 Which statement describes the compound shown below?

- A It is a colorless flammable gas.
- **B** It is a liquid which decolorizes bromine water.
- C It is a liquid with a characteristic smell.
- **D** It is formed when ethane reacts with steam.
- **39** A hydrocarbon A is cracked to make B and hydrogen.

Compound C is formed by the addition polymerization of B.

To which homologous series do A, B and C belong?

	alkene	alkane
Α	А	B and C
В	В	A and C
С	С	A and B
D	-	A and C

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40 Ethanol is manufactured from petroleum by reacting ethene with steam.

Which statements about this process are correct?

- 1 Ethene is obtained from the cracking of alkanes.
- 2 The process is carried out in the presence of yeast.
- 3 The reaction is an addition reaction.
- 4 The rate of reaction is increased by a catalyst.

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

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The Periodic Table of the Elements DATA SHEET

					1	6				my	Dana Cambridge Con
]			Mac.
C) 4	Helium	20 Ne Neon	40 Ar Argon	84 Kr Krypton 36	131 Xe Xenon	Radon		Lutetium 7.1	Lr Lawrenciu 103	SANTA.
>	>		19 T Fluorine	35.5 C1 Chlorine	80 Br Bromine 35	127 T lodine 53	At Astatine 85		Yb Ytterbium 70	Nobelium	Se.con
>	>		16 Oxygen 8	32 S Sulfur	79 Se Selenium 34	128 Te Tellurium 52	Po Polonium 84		169 Tm Thulium 69	Md Mendelevium 101	
>	>		14 Nitrogen 7	31 P Phosphorus	75 AS Arsenic 33	122 Sb Antimony 51	209 Bi Bismuth		167 Er Erbium 68	Fm Fermium	
≥	<u>></u>		12 C Carbon 6	28 Si Siicon	73 Ge Germanium 32	119 Sn Tin	207 Pb Lead		165 Ho Holmium 67	ES Einsteinium 99	(r.t.p.).
	≣		11 B Boron 5	27 A1 Auminum	70 Ga Gallium 31	115 In	204 T 1 Thallium		162 Dy Dysprosium 66		oressure
		'			65 Zn Zinc 30	Cd Cadmium C48	201 Hg Mercury 80		159 Tb Terbium 65	BK srkelium	ture and p
Group					64 Cu Copper	108 Ag Silver 47	197 Au Gold		Gd Gadolinium 64	Cm Ourium	temperal
					59 Ni Nickel	106 Pd Palladium 46	195 Pt Platinum		152 Eu Europium 63	Am	³ at room
					59 Co Cobalt Cobalt	Rhodium 45	192 Ir Iridium		Samarium 62		s is 24 dm
	-	Hydrogen			56 Fe Iron	Ru Ruthenium 44	190 Os Osmium 76		Pm Promethium 61	Np	of any gas
					Manganese 25	Tc Technetium	186 Re Rhenium 75	_	Neodymium 60		ne mole c
					52 Cr Chromium 24	96 Mo Molybdenum 42			Pr Praseodymium 59		The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
					51 V Vanadium 23	Niobium 41	181 Ta Tantalum 73		740 Cerium F	Z32 Th Thorium	The voi
					48 Ti Titanium 22	91 Zr Zirconium 40	178 Haf Hafnium 72			nass	
					Scandium 21	89 × Yttrium 39	139 La Lanthanum 57 * 7	227 Ac Actinium †	series ries	a = relative atomic massX = atomic symbolb = proton (atomic) number	
=	=		9 Be Beryllium	24 Mg Magnesium	40 Ca Calcium 20	Sr Strontium	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series	x = x = b = p = p = p = p = p = p = p = p = p	
-	-		7 Lithium 3	23 Na Sodium 1	39 K Potassium	Rubidium 3	CS CS	Francium 87	58-71 Lar 30-103 Aα	Key b	

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

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