Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **October/November 2017**

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, Centre 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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level1/Level 2 Certificate.

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

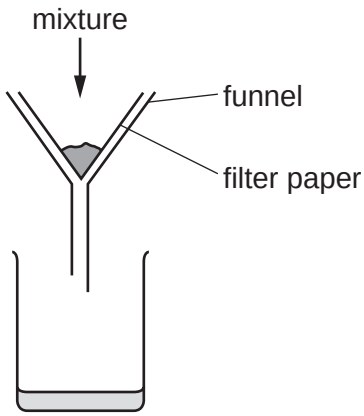
1 The melting points and boiling points of four elements are shown.

element	melting point / °C	boiling point / °C
W	–7	60
X	–101	–34
Y	114	184
Z	39	688

In which elements do the particles vibrate about fixed positions at 0 °C?

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

2 The apparatus used to separate a mixture is shown.



What is the mixture?

A aqueous calcium chloride and aqueous calcium nitrate

B calcium carbonate and aqueous calcium chloride

C ethanol and water

D sand and calcium carbonate

3 During an experiment a measurement is recorded in cm^3.

Which apparatus is used?

A balance

B measuring cylinder

C stopclock

D thermometer

4 Substance Q boils at 445 °C and is a yellow solid at room temperature.

Which temperature could be the melting point of pure Q?

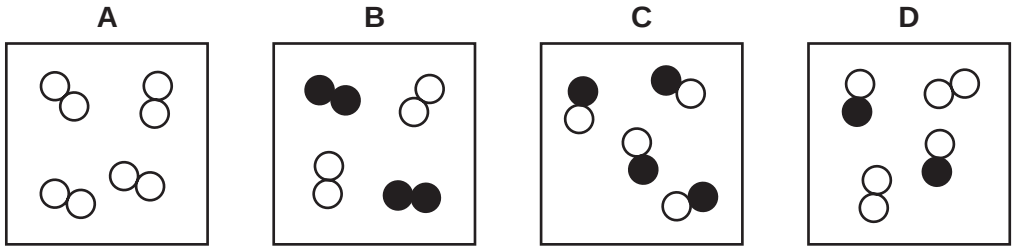
A –9 °C

B 72 °C to 78 °C

C 116 °C

D 116 °C to 126 °C

5 Which diagram shows a mixture of an element and a compound?



6 Which pair of atoms contains the same number of neutrons?

A $^{59}_{27}Co$ and $^{59}_{28}Ni$

B $^{64}_{29}Cu$ and $^{65}_{29}Cu$

C $^{64}_{29}Cu$ and $^{65}_{30}Zn$

D $^{65}_{29}Cu$ and $^{65}_{30}Zn$

7 In which row do the properties described match the type of bonding?

	melting point	electrical conductivity when liquid	type of bonding
A	high	does not conduct	ionic
B	low	conducts	covalent
C	low	conducts	ionic
D	low	does not conduct	covalent

8 Which statement explains why graphite is used a lubricant?

A All bonds between the atoms are weak.

B It conducts electricity.

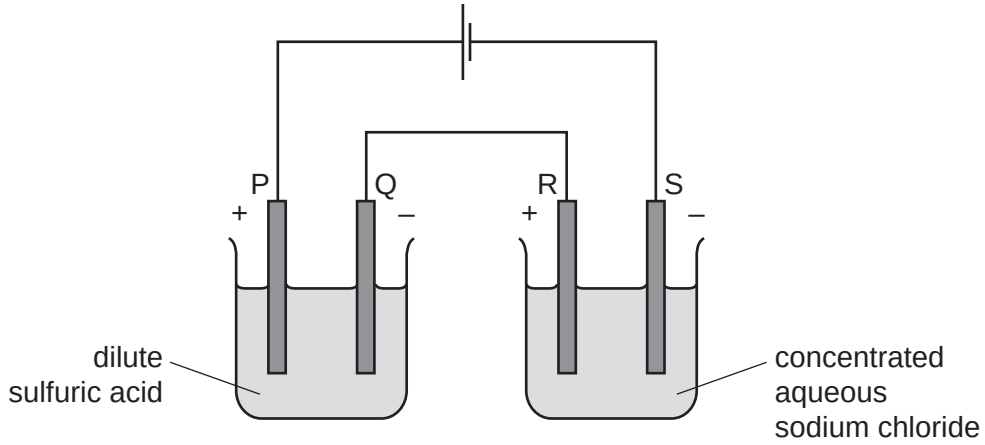
C It has a low melting point.

D Layers in the structure can slide over each other.

9 What is the relative formula mass of magnesium nitrate, $Mg(NO_3)_2$?

A 74 **B** 86 **C** 134 **D** 148

10 The diagram shows the electrolysis of two solutions using inert electrodes.



Which substance is made at each electrode?

	P	Q	R	S
A	hydrogen	oxygen	chlorine	sodium
B	hydrogen	oxygen	sodium	chlorine
C	oxygen	hydrogen	chlorine	hydrogen
D	oxygen	hydrogen	hydrogen	chlorine

11 Two chemical processes are described.

- During the combustion of ethanol, energy is .....1..... .
- During the electrolysis of aqueous sodium chloride, energy is .....2..... .

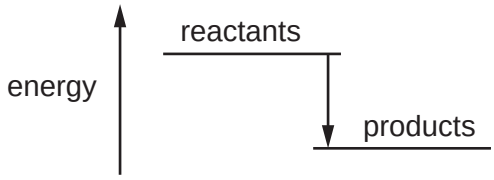
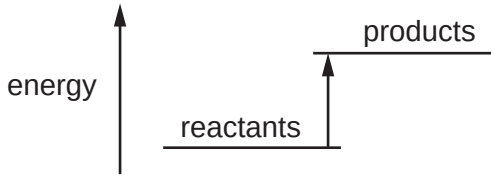
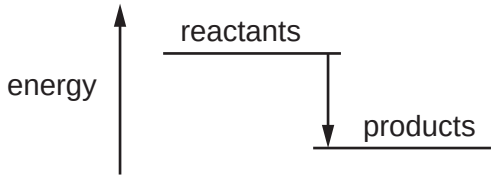
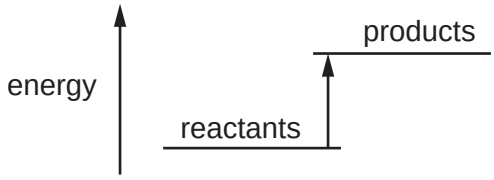
Which words complete gaps 1 and 2?

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

12 Water is added to anhydrous copper(II) sulfate in a test-tube.

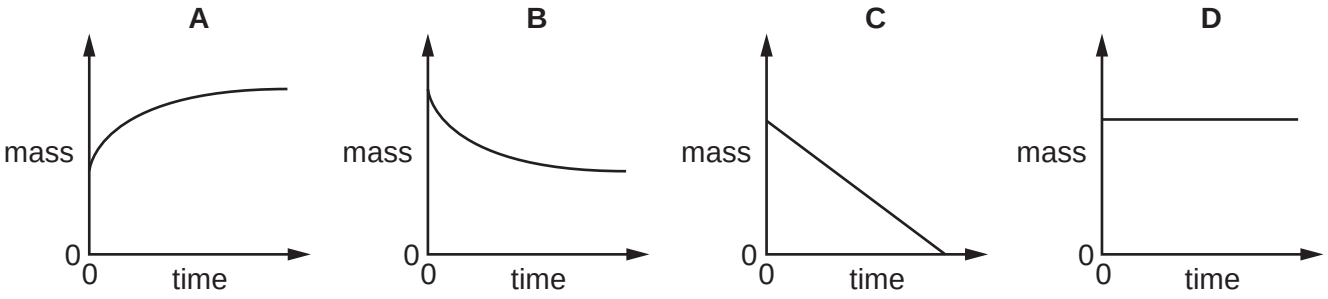
The mixture becomes hot.

Which type of reaction and energy level diagram apply to this reaction?

	type of reaction	energy level diagram
A	endothermic	
B	endothermic	
C	exothermic	
D	exothermic	

13 The mass of a beaker and its contents is plotted against time.

Which graph represents what happens when sodium carbonate reacts with an excess of dilute hydrochloric acid in an open beaker?



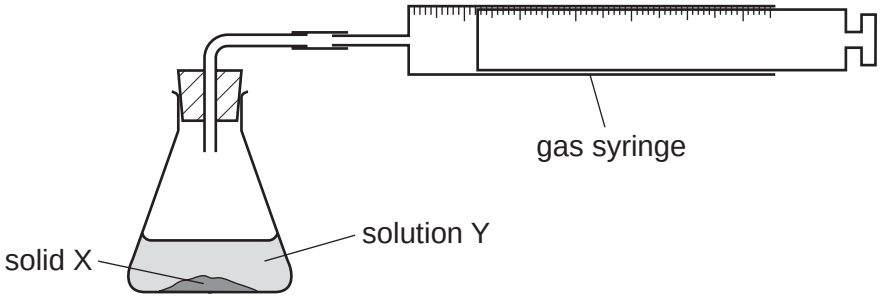
14 When blue copper(II) sulfate is heated, a white solid and water are formed.

The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reactions
A	a mixture	can be reversed
B	a mixture	cannot be reversed
C	hydrated	can be reversed
D	hydrated	cannot be reversed

15 An experiment was carried out to find the rate of reaction when 1 g of solid X reacts with 100 cm^3 of solution Y.



The experiment took place too quickly for measurements to be made.

Which change could be made to slow down the reaction?

A add a catalyst

B decrease the concentration of solution Y

C decrease the particle size of solid X

D increase the temperature

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

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

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

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

	P	Q
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

17 What is **not** a typical characteristic of acids?

A They react with alkalis producing water.

B They react with **all** metals producing hydrogen.

C They react with carbonates producing carbon dioxide.

D They turn blue litmus paper red.

18 Elements Q and R both burn in air.

The oxides formed both dissolve in water.

The solution of the oxide formed from element Q turns Universal Indicator red.

The solution of the oxide formed from element R turns Universal Indicator blue.

What are Q and R?

	Q	R
A	carbon	sulfur
B	sodium	magnesium
C	sodium	sulfur
D	sulfur	sodium

19 Copper(II) sulfate can be prepared by adding excess copper(II) carbonate to sulfuric acid.

Why is an **excess** of copper(II) carbonate added?

A to ensure all the copper(II) carbonate has reacted

B to ensure all the sulfuric acid has reacted

C to increase the rate of reaction

D to increase the yield of copper(II) sulfate

20 Compound P reacts with hydrochloric acid to produce a gas that turns limewater milky.

What is P?

A sodium carbonate

B sodium chloride

C sodium hydroxide

D sodium sulfate

21 Which statement about nitrogen and phosphorus is **not** correct?

A Both are in the same group of the Periodic Table.

B Both are in the same period of the Periodic Table.

C Both are non-metals.

D Both have the same number of electrons in their outer shell.

22 Sodium and rubidium are elements in Group I of the Periodic Table.

Which statement is correct?

A Sodium atoms have more electrons than rubidium atoms.

B Sodium has a lower density than rubidium.

C Sodium has a lower melting point than rubidium.

D Sodium is more reactive than rubidium.

23 Which properties do the elements chromium, iron and vanadium have in common?

1 They all conduct electricity.

2 They, or their compounds, can act as catalysts.

3 They all form coloured compounds.

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

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 What is a property of **all** metals?

A conduct electricity

B hard

C low melting points

D react with water

26 Which process is used to extract iron from hematite in the blast furnace?

A electrolysis

B reduction with carbon monoxide

C reduction with lime

D thermal decomposition

27 Some reactions of three metals are listed in the table.

metal	metal reacts with dilute hydrochloric acid	metal oxide is reduced by carbon
P	yes	yes
Q	yes	no
R	no	yes

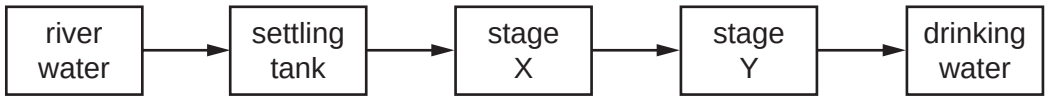
What is the order of reactivity of the metals?

	most reactive →		least reactive
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	R	P	Q

28 Which uses of the metals shown are both correct?

	aluminium	copper
A	aircraft bodies	electrical wiring
B	car bodies	aircraft bodies
C	chemical plant	cooking utensils
D	food containers	chemical plant

29 The flow chart shows stages in the treatment of river water to produce drinking water.



What occurs at stages X and Y?

	X	Y
A	distillation	chlorination
B	distillation	filtration
C	filtration	chlorination
D	filtration	distillation

30 Which element in Group VI is a component of air?

A argon

B nitrogen

C oxygen

D sulfur

31 Iron is a metal that rusts in the presence of oxygen and water.

Mild steel is used for .....1..... and is prevented from rusting by .....2..... .

Stainless steel does not rust. It is produced by .....3..... iron with another metal.

Which words complete gaps 1, 2 and 3?

	1	2	3
A	car bodies	greasing	covering
B	car bodies	painting	mixing
C	cutlery	greasing	covering
D	cutlery	painting	mixing

32 A chemical reaction is carried out on substance X.

A gas is produced that turns red litmus paper blue.

What is this reaction?

A the reaction of an acid with a metal carbonate

B the reaction of an acid with an ammonium salt

C the reaction of an alkali with a metal carbonate

D the reaction of an alkali with an ammonium salt

33 Some marble chips (calcium carbonate) are heated strongly and substances X and Y are formed.

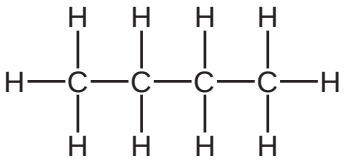
Substance X is a white solid that reacts with water, giving out heat. Substance Y is a colourless gas.

What are substances X and Y?

	X	Y
A	calcium chloride	oxygen
B	calcium hydroxide	carbon dioxide
C	calcium oxide	carbon dioxide
D	calcium sulfate	oxygen

34 The structures of four organic compounds are shown.

S



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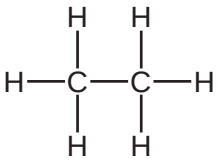

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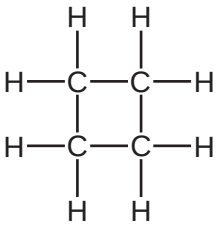
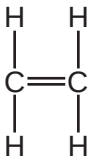


V



Which compounds are unsaturated?

A S only **B** T and U **C** U only **D** V only

35 Which statement is **not** correct?

A Petroleum is a mixture of hydrocarbons.

B The main constituent of natural gas is ethane.

C The naphtha fraction of petroleum is used for making chemicals.

D When natural gas burns in air, carbon dioxide and water are formed.

36 Which equation represents the complete combustion of butane, C_4H_{10}?

A $2C_4H_{10} + 5O_2 \rightarrow 8C + 10H_2O$

B $2C_4H_{10} + 9O_2 \rightarrow 8CO + 10H_2O$

C $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

D $C_4H_{10} + 4O_2 \rightarrow 4CO_2 + 5H_2$

37 X, Y and Z are three hydrocarbons.

X $CH_2=CH_2$ Y $CH_3–CH=CH_2$ Z $CH_3–CH_2–CH=CH_2$

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

38 The table shows bonds that are present and bonds that are not present in compound X.

bond	
C–C	✓
C=C	✗
C–H	✓
C–O	✓
C=O	✓
O–H	✓

What type of compound is X?

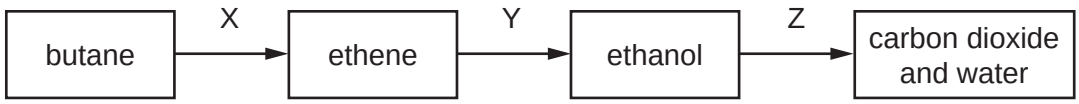
A a carboxylic acid

B an alcohol

C an alkane

D an alkene

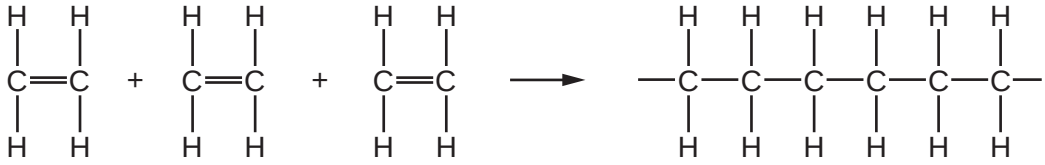
39 The diagram shows a reaction sequence.



Which row names the processes X, Y and Z?

	X	Y	Z
A	cracking	fermentation	respiration
B	cracking	hydration	combustion
C	distillation	fermentation	respiration
D	distillation	hydration	combustion

40 Molecules of a substance react together as shown.



Which type of reaction has taken place?

A cracking

B oxidation

C polymerisation

D reduction

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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