Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **October/November 2016**

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 Level 1/Level 2 Certificate.

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

1 ‘Particles moving **very slowly** from an area of higher concentration to an area of lower concentration.’

Which process is being described?

A a liquid being frozen

B a solid melting

C a substance diffusing through a liquid

D a substance diffusing through the air

2 A student mixes 25 cm^3 samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide.

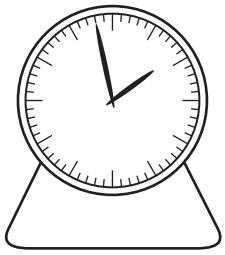
In each case, the student measures the change in temperature to test if the reaction is exothermic.

Which piece of apparatus is **not** needed?

A

burette

B

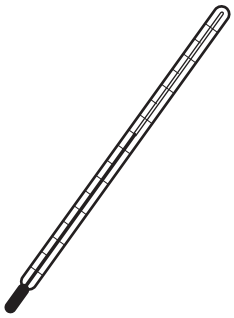


clock

C

pipette

D



thermometer

3 A sample contains a mixture of powdered limestone (calcium carbonate), sugar and wax.

What is the correct way to obtain a pure sample of sugar?

A Dissolve the mixture in dilute hydrochloric acid, filter and wash the residue.

B Dissolve the mixture in hexane, filter and evaporate the filtrate.

C Dissolve the mixture in water, filter and evaporate the filtrate.

D Dissolve the mixture in water, filter and wash the residue.

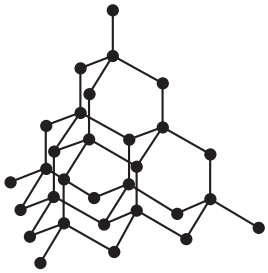
4 The table shows information about four different particles.

particle	proton number	nucleon number	number of protons	number of neutrons	number of electrons
Na	11	23	11	W	11
Na^+	11	23	11	12	X
O	8	16	8	Y	8
O^{2-}	8	16	8	8	Z

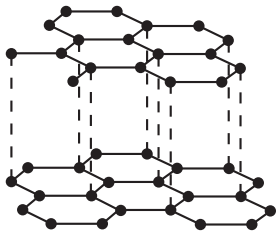
What are the values of W, X, Y and Z?

	W	X	Y	Z
A	11	10	10	8
B	11	11	8	10
C	12	10	8	10
D	12	11	10	8

5 Which pair of statements about diamond and graphite is correct?



diamond



graphite

A Diamond and graphite are both pure carbon. They are both macromolecules.

B Diamond and graphite can both be used as electrodes. Graphite is also used as a lubricant.

C Diamond has covalent bonds. Graphite has ionic bonds.

D Diamond is hard with a high melting point. Graphite is soft with a low melting point.

[Turn over

6 Which row shows the electronic structure of the sodium ion and the chloride ion in sodium chloride?

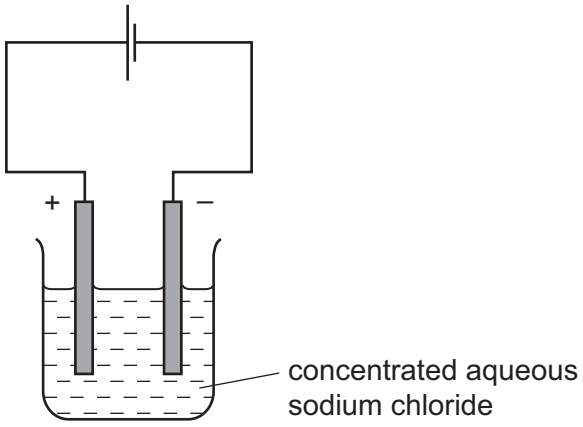
	sodium ion	chloride ion
A	2,8	2,8,7
B	2,8	2,8,8
C	2,8,1	2,8,7
D	2,8,1	2,8,8

7 A molecule of X contains two bromine atoms, three carbon atoms, six hydrogen atoms and one oxygen atom.

What is the formula of X?

A CHBrO **B** $C_3H_6B_2O$ **C** $C_3H_6Br_2O$ **D** C3H6Br2O

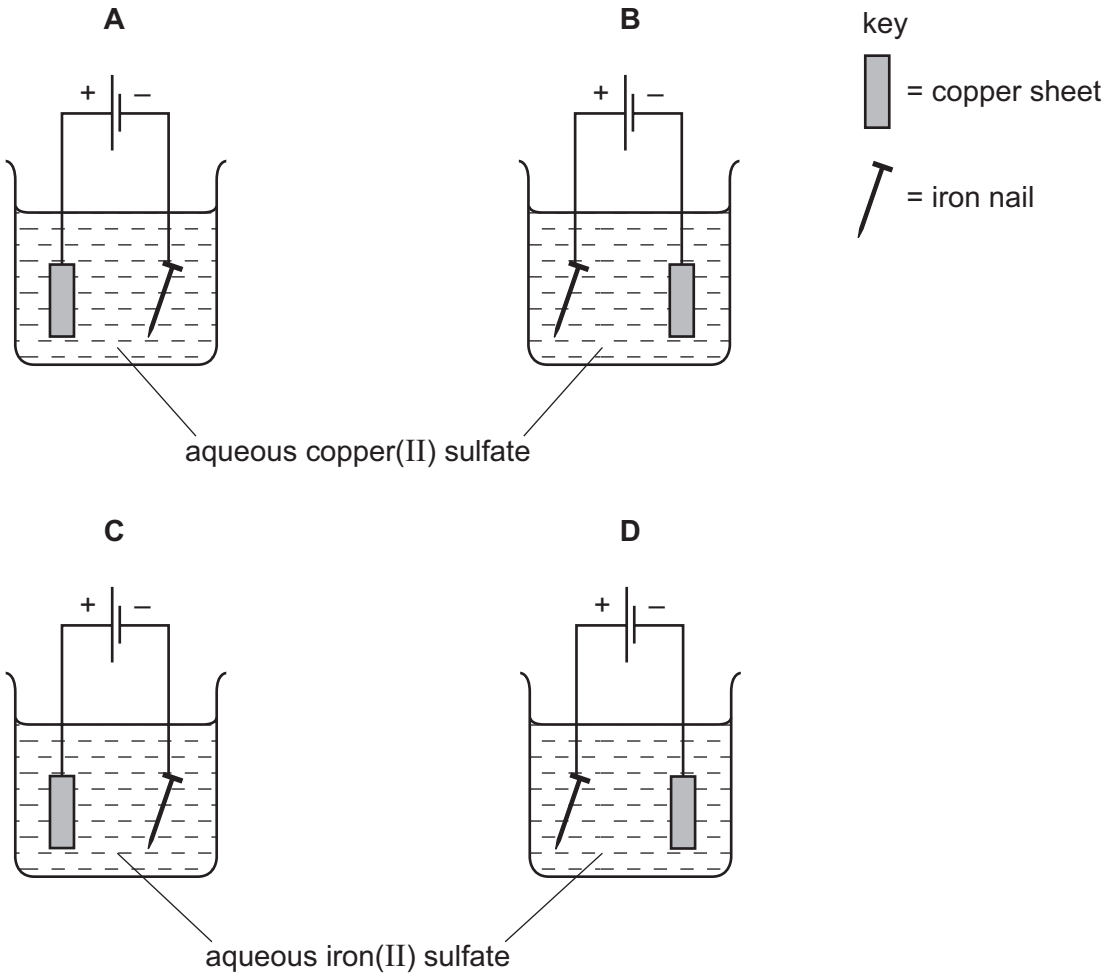
8 The diagram shows the electrolysis of concentrated aqueous sodium chloride using inert electrodes.



Which substances are produced at the electrodes?

	anode	cathode
A	colourless gas	colourless gas
B	colourless gas	green gas
C	green gas	colourless gas
D	green gas	green gas

9 Which apparatus could be used to electroplate an iron nail with copper?



10 Which experiment is the most exothermic?

	initial temperature / °C	final temperature / °C
A	20	5
B	20	32
C	25	12
D	25	34

11 Which substance is **not** used as a fuel?

A bitumen

B diesel

C gasoline

D hydrogen

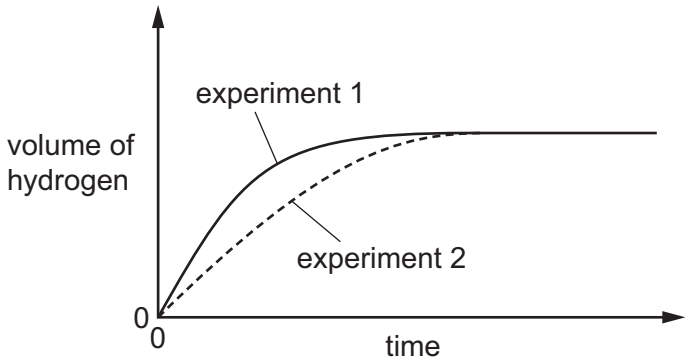
[Turn over

12 Zinc granules are reacted with excess dilute hydrochloric acid.

The volume of hydrogen given off is measured at different times.

The results are shown on the graph, labelled experiment 1.

The results for a second experiment are also shown on the graph, labelled experiment 2.



Which change to the conditions was made in experiment 2?

A The concentration of the hydrochloric acid was decreased.

B The size of the zinc granules was decreased.

C The surface area of the zinc granules was increased.

D The temperature was increased.

13 When green crystals of nickel(II) sulfate are heated, water is given off and a yellow solid remains. When water is added to the yellow solid, the green colour returns.

Which process describes these changes?

A combustion

B corrosion

C neutralisation

D reversible reaction

14 In which reaction is the copper compound reduced?

A $CuCO_3 \rightarrow CuO + CO_2$

B $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$

C $CuSO_4 + 2NaOH \rightarrow Cu(OH)_2 + Na_2SO_4$

D $2CuO + C \rightarrow 2Cu + CO_2$

15 The element selenium forms the oxide SeO_2. This oxide dissolves in concentrated aqueous sodium hydroxide.

The element zirconium forms the oxide ZrO_2. This oxide dissolves in concentrated sulfuric acid.

How are the elements selenium and zirconium classified?

	selenium	zirconium
A	metal	metal
B	metal	non-metal
C	non-metal	metal
D	non-metal	non-metal

16 Aqueous sodium hydroxide was added slowly, until in excess, to separate solutions of W, X, Y and Z.

The results are shown.

solution	initial observation with aqueous sodium hydroxide	final observation with excess aqueous sodium hydroxide
W	white precipitate formed	precipitate dissolves
X	white precipitate formed	no change
Y	pale blue precipitate formed	no change
Z	green precipitate formed	no change

Which row identifies the metal ions in the solutions?

	metal ion in solution W	metal ion in solution X	metal ion in solution Y	metal ion in solution Z
A	aluminium	calcium	copper(II)	iron(II)
B	aluminium	calcium	iron(II)	copper(II)
C	aluminium	iron(II)	calcium	copper(II)
D	calcium	aluminium	copper(II)	iron(II)

[Turn over

17 Acids can react with metal oxides, carbonates and metals.

Which reactions produce a gas?

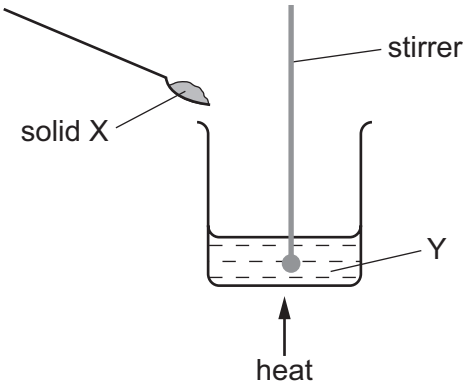
	acid with metal oxide	acid with carbonate	acid with metal
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

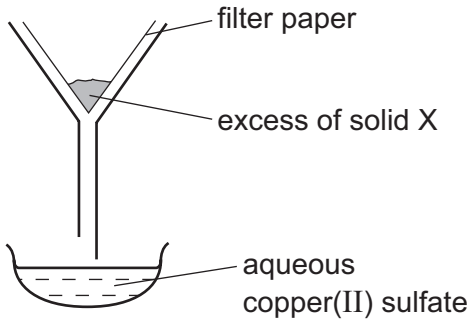
key

✓ = gas is produced

✗ = no gas is produced

18 The apparatus shown is used to prepare aqueous copper(II) sulfate.

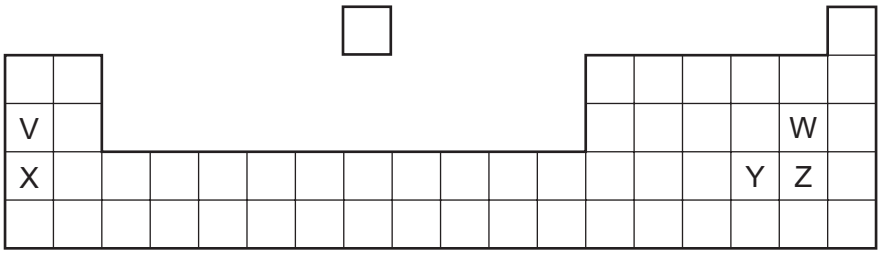




What are X and Y?

	X	Y
A	copper	aqueous iron(II) sulfate
B	copper(II) chloride	sulfuric acid
C	copper(II) oxide	sulfuric acid
D	sulfur	aqueous copper(II) chloride

19 Part of the Periodic Table is shown.



Which statement about the elements is correct?

A V has a higher melting point than X.

B X is less reactive than V.

C Y has less metallic character than Z.

D Z is more reactive than W.

20 What is **not** a property of Group I metals?

A They are soft and can be cut with a knife.

B They react when exposed to oxygen in the air.

C They produce an acidic solution when they react with water.

D They react rapidly with water producing hydrogen gas.

21 Which gas is **not** a noble gas?

A fluorine

B helium

C radon

D xenon

22 Which element is a transition element?

	colour of chloride	melting point of element / °C
A	orange	113
B	orange	1535
C	white	113
D	white	1535

[Turn over

23 Which statement about the elements in Group VII is **not** correct?

A Br_2 is less reactive than I_2.

B Cl_2 is used for water treatment.

C F_2 is a covalent molecule.

D I_2 forms a purple vapour when warmed.

24 Four metals are listed in decreasing order of reactivity.

magnesium

zinc

iron

copper

Titanium reacts with acid and cannot be extracted from its ore by heating with carbon.

Where should titanium be placed in the list?

A below copper

B between iron and copper

C between magnesium and zinc

D between zinc and iron

25 Impurities in iron obtained from the blast furnace include carbon, phosphorus and silicon.

Which impurities are removed from the molten iron as gases when it is made into steel?

A carbon and phosphorus

B carbon and silicon

C carbon only

D phosphorus and silicon

26 A student added dilute hydrochloric acid to four metals and recorded the results.

Some of the results are **not** correct.

	results	
	metal	gas given off
1	copper	yes
2	iron	yes
3	magnesium	no
4	zinc	yes

Which **two** results are correct?

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

27 What is a common use of mild steel?

A aircraft manufacture

B electrical wiring

C making car bodies

D making cutlery

28 River water contains soluble impurities, insoluble impurities and bacteria.

River water is made safe to drink by filtration and chlorination.

Which statement is correct?

A Filtration removes bacteria and insoluble impurities, and chlorination removes soluble impurities.

B Filtration removes insoluble impurities, and chlorination kills the bacteria.

C Filtration removes soluble and insoluble impurities, and chlorination kills the bacteria.

D Filtration removes soluble impurities and bacteria, and chlorination removes insoluble impurities.

29 Air is a mixture of gases.

Which gas is present in the largest amount?

A argon

B carbon dioxide

C nitrogen

D oxygen

30 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

key

✓ = true

✗ = false

31 Aqueous sodium hydroxide is added to a sample of a fertiliser and the mixture warmed.

Ammonia gas is given off.

Which ion does the fertiliser contain?

A ammonium

B nitrate

C phosphate

D potassium

32 Which reaction would **not** result in the production of carbon dioxide?

A combustion of methane

B fermentation

C reaction between an acid and a metal

D respiration

33 Which substance gives off carbon dioxide on heating?

A lime

B limestone

C limewater

D slaked lime

34 Petroleum is separated into fractions.

Which statement is **not** correct?

A Each fraction contains a mixture of hydrocarbon molecules.

B Fuel oil burns easily and is used as fuel in cars.

C Refinery gas is the fraction containing the smallest molecules.

D The fractions are separated depending on their boiling point range.

35 Butane reacts as shown.

$$\text{butane} \xrightarrow[\text{and heat}]{\text{catalyst}} \text{butene} + \text{hydrogen}$$

What is this type of reaction?

A combustion

B cracking

C polymerisation

D reduction

36 Which compound is **not** a member of the alkene homologous series?

A CH_3CHCH_2

B $CH_3CH_2CHCH_2$

C $CH_3CHCHCH_3$

D $CH_3CH_2CH_2CH_2CH_3$

37 Which compound decolourises aqueous bromine?

A 2-methylpropane

B butane

C cyclohexane

D hexene

38 The equation represents the fermentation of X.

$$\text{X} \xrightarrow{\text{yeast}} \text{ethanol} + \text{carbon dioxide}$$

What is X?

A ethanoic acid

B ethene

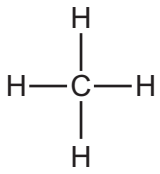
C glucose

D methanol

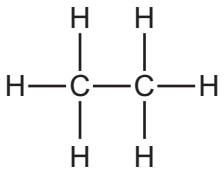
[Turn over

39 Which molecule can be polymerised?

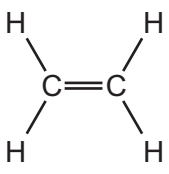
A



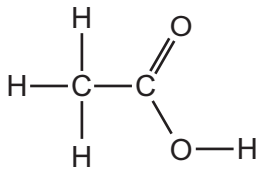
B



C



D



40 Which equation for the complete combustion of ethanol is correct?

A $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

B $2C_2H_5OH + 7O_2 \rightarrow 4CO_2 + 6H_2O$

C $2C_2H_5OH + 5O_2 \rightarrow 2CO_2 + 6H_2O$

D $4C_2H_5OH + 7O_2 \rightarrow 4CO_2 + 10H_2O$

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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.)