Cambridge IGCSE

**Cambridge Assessment International Education**
Cambridge International General Certificate of Secondary Education

**CHEMISTRY** **0620/12**

Paper 1 Multiple Choice (Core) **February/March 2019**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 3 8 6 9 7 8 7 3 5 8 *

**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.

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



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**1** Four processes are listed.

1 Brownian motion

2 condensation

3 diffusion

4 evaporation

Which processes involve a change of state?

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

**2** A student measures the time taken for 2.0 g of magnesium to dissolve in 50 $cm^3$ of dilute sulfuric acid.

Which apparatus is essential to complete the experiment?

1 stop-clock

2 measuring cylinder

3 thermometer

4 balance

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

**3** Which method should be used to separate a mixture of two liquids?

**A** crystallisation

**B** electrolysis

**C** filtration

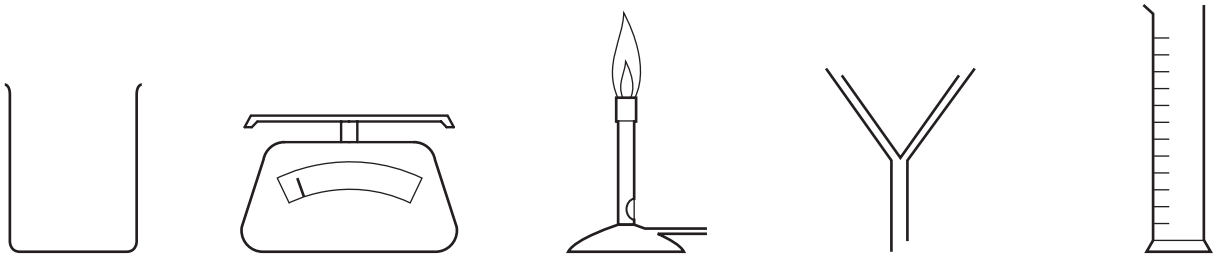
**D** fractional distillation

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**4** Lead(II) iodide is insoluble in water.

Lead(II) iodide is made by adding aqueous lead(II) nitrate to aqueous potassium iodide.

Which pieces of apparatus are needed to obtain solid lead(II) iodide from 20 $cm^3$ of aqueous lead(II) nitrate?



1 2 3 4 5

**A** 1, 2 and 4 **B** 1, 3 and 5 **C** 1, 4 and 5 **D** 2, 4 and 5

**5** Which row describes isotopes of the same element?

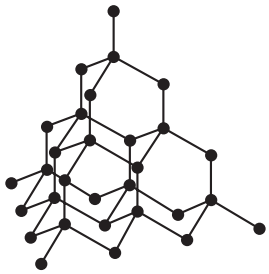
| | number of protons | number of neutrons |
|---|---|---|
| **A** | different | different |
| **B** | different | same |
| **C** | same | different |
| **D** | same | same |

**6** Which row describes the structure of the positive ion in sodium chloride?

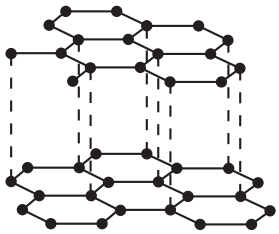
| | protons | electrons | neutrons |
|---|---|---|---|
| **A** | 11 | 11 | 12 |
| **B** | 11 | 10 | 12 |
| **C** | 17 | 17 | 18 |
| **D** | 17 | 18 | 18 |

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**7** 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.

**8** What is the nucleon number of an atom?

**A** the number of neutrons

**B** the number of protons

**C** the total number of protons and neutrons

**D** the total number of protons and electrons

**9** The relative formula mass, $M_r$, of calcium carbonate, $CaCO_3$, is 100.

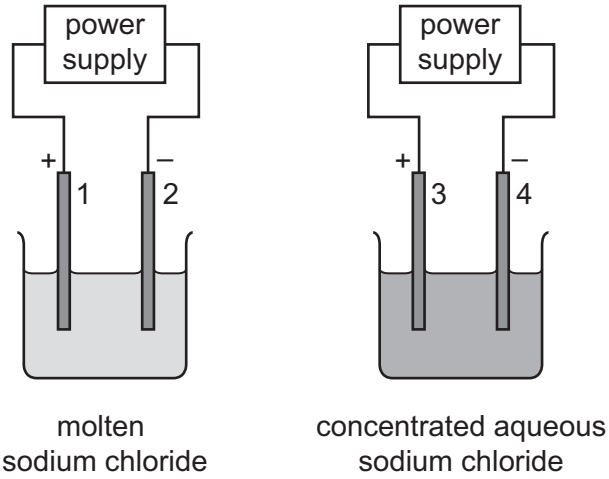
What is the mass of carbon present in 100 g of calcium carbonate?

**A** 12 g **B** 36 g **C** 40 g **D** 60 g

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**10** Two electrolysis experiments were carried out as shown.

The graphite electrodes are labelled 1–4.




molten sodium chloride

concentrated aqueous sodium chloride

Which row describes the products at the electrodes in these experiments?

| | electrode 1 | electrode 2 | electrode 3 | electrode 4 |
|---|---|---|---|---|
| **A** | chlorine | hydrogen | chlorine | hydrogen |
| **B** | chlorine | sodium | chlorine | hydrogen |
| **C** | chlorine | sodium | hydrogen | chlorine |
| **D** | sodium | chlorine | sodium | chlorine |

**11** 10 g of ammonium nitrate is added to water at 25 °C and the mixture stirred.

The ammonium nitrate dissolves and, after one minute, the temperature of the solution is 10 °C.

Which word describes this change?

**A** endothermic

**B** exothermic

**C** neutralisation

**D** reduction

**12** Which process involves a chemical change?

**A** dissolving copper(II) sulfate

**B** distilling ethanol

**C** freezing water

**D** neutralising copper(II) oxide

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**[Turn over**

**13** Lumps of limestone react with dilute hydrochloric acid according to the equation shown.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

Which change in conditions decreases the rate of the reaction?

**A** increase the concentration of the acid

**B** increase the volume of the acid

**C** increase the size of the lumps of limestone

**D** increase the temperature

**14** Which reaction is reversible?

**A** $Cu + ZnSO_4 \rightarrow CuSO_4 + Zn$

**B** $CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$

**C** $CuO + H_2 \rightarrow Cu + H_2O$

**D** $CuSO_4 \bullet 5H_2O \rightarrow CuSO_4 + 5H_2O$

**15** The reaction between magnesium and carbon dioxide is shown in the equation.

$$2Mg + CO_2 \rightarrow 2MgO + C$$

Which statement describes what happens in this reaction?

**A** Carbon is oxidised.

**B** Magnesium is reduced.

**C** Neither oxidation nor reduction happens.

**D** The carbon in carbon dioxide is reduced.

**16** Barium hydroxide is an alkali. It reacts with hydrochloric acid.

How does the pH of the hydrochloric acid change as an excess of aqueous barium hydroxide is added?

**A** The pH decreases from pH 14 and becomes constant at pH 7.

**B** The pH decreases from pH 14 to about pH 1.

**C** The pH increases from pH 1 and becomes constant at pH 7.

**D** The pH increases from pH 1 to about pH 14.

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**17** Copper(II) sulfate crystals are blue. They are made by adding an excess of copper(II) oxide to sulfuric acid.

The mixture is heated and stirred.

It is then filtered and the filtrate is allowed to evaporate, leaving blue crystals.

Why is filtration necessary?

**A** to remove soluble properties

**B** to remove sulfuric acid

**C** to remove the blue crystals

**D** to remove unreacted copper(II) oxide

**18** The results of two tests on an aqueous solution of X are shown.

| test | observation |
|---|---|
| aqueous sodium hydroxide added | green precipitate formed |
| acidified aqueous silver nitrate added | yellow precipitate formed |

What is X?

**A** copper(II) chloride

**B** copper(II) iodide

**C** iron(II) chloride

**D** iron(II) iodide

**19** Information about the solubility in water of four oxides is shown.

Which oxide, when added to water, gives a solution with a pH less than pH 7?

| | name of oxide | solubility in water |
|---|---|---|
| **A** | nitrogen dioxide | soluble |
| **B** | copper(II) oxide | insoluble |
| **C** | silicon(IV) oxide | insoluble |
| **D** | barium oxide | soluble |

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**[Turn over**

**20** The elements sodium to argon form Period 3 of the Periodic Table.

Which row describes the trend across Period 3 from left to right?

| | number of outer shell electrons | metallic character | group number |
|---|---|---|---|
| **A** | decreases | decreases | decreases |
| **B** | decreases | increases | decreases |
| **C** | increases | decreases | increases |
| **D** | increases | increases | increases |

**21** Astatine is below iodine in Group VII in the Periodic Table.

Which row describes the properties of astatine?

| | state at room temperature | reactivity |
|---|---|---|
| **A** | gas | displaces chlorine, bromine and iodine |
| **B** | gas | displaces iodine but does not displace chlorine or bromine |
| **C** | solid | displaces iodine but does not displace chlorine or bromine |
| **D** | solid | does not displace chlorine, bromine or iodine |

**22** Which row describes a transition element?

| | density in $g/cm^3$ | colour of chloride |
|---|---|---|
| **A** | 0.98 | green |
| **B** | 0.98 | white |
| **C** | 8.90 | green |
| **D** | 8.90 | white |

**23** Which statement explains why elements in Group VIII of the Periodic Table are unreactive?

**A** They are monatomic gases.

**B** They form stable diatomic molecules.

**C** They have a full outer shell of electrons.

**D** They share electrons with each other.

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**24** The electrical conductivity of magnesium was tested.

Magnesium was then added to dilute sulfuric acid and a gas, Q, was produced.

Which row is correct?

| | electrical conductivity of magnesium | gas Q |
|---|---|---|
| **A** | good | hydrogen |
| **B** | good | oxygen |
| **C** | poor | hydrogen |
| **D** | poor | oxygen |

**25** Four reactions that take place in the blast furnace to produce iron are shown.

Which reaction is used to keep the furnace hot?

**A** $C + O_2 \rightarrow CO_2$

**B** $CO_2 + C \rightarrow 2CO$

**C** $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

**D** $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

**26** The list gives the order of some metals and hydrogen in the reactivity series.

Metal X is also included.

| | |
|---|---|
| most reactive | K |
| | Mg |
| | Zn |
| | H |
| | X |
| least reactive | Cu |

Which row correctly shows the properties of metal X?

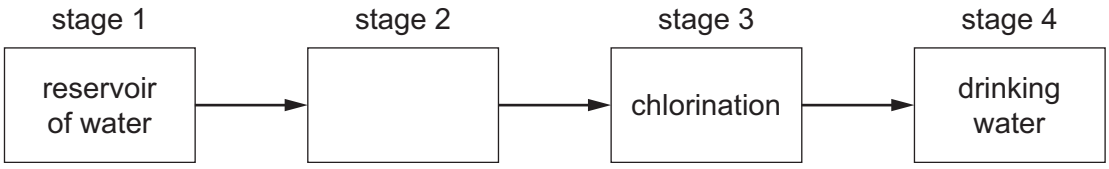
| | reacts with dilute acids | oxide reduced by carbon |
|---|---|---|
| **A** | no | no |
| **B** | no | yes |
| **C** | yes | no |
| **D** | yes | yes |

**27** The properties of four elements are shown.

Which element is used to make aircraft bodies?

| | density | brittle or malleable |
|---|---|---|
| **A** | high | brittle |
| **B** | high | malleable |
| **C** | low | brittle |
| **D** | low | malleable |

**28** The diagram shows how water is treated to make it suitable for drinking.




What happens in stage 2?

**A** condensation

**B** sublimation

**C** evaporation

**D** filtration

**29** A farmer treats a field with calcium hydroxide to make it less acidic.

When the farmer adds ammonium nitrate fertiliser to the field immediately after the calcium hydroxide, they react.

Why does this reaction make the fertiliser less effective?

**A** It makes ammonia gas, so less nitrogen is absorbed by the soil.

**B** It makes an acid, making the soil acidic again.

**C** It makes nitrogen gas, so less nitrogen is absorbed by the soil.

**D** It makes the fertiliser too strong, stopping the plants growing so well.

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**30** Which row showing an air pollutant and its major source is **not** correct?

| | pollutant | major source of pollutant |
|---|---|---|
| **A** | carbon monoxide | complete combustion of carbon fuels |
| **B** | lead compounds | leaded petrol |
| **C** | oxides of nitrogen | car engines |
| **D** | sulfur dioxide | fossil fuels containing sulfur |

**31** Which substances are needed for iron to rust?

**A** carbon dioxide and oxygen

**B** oxygen only

**C** water and carbon dioxide

**D** water and oxygen

**32** Methane and carbon dioxide are both greenhouse gases.

Which row identifies a source of methane and a source of carbon dioxide?

| | source of methane | source of carbon dioxide |
|---|---|---|
| **A** | decomposition of vegetation | hydrogen car exhausts |
| **B** | digestion in animals | diesel car exhausts |
| **C** | petrol car exhausts | decomposition of vegetation |
| **D** | respiration | petrol car exhausts |

**33** Which element has an oxide that is used as a food preservative?

**A** helium

**B** hydrogen

**C** iron

**D** sulfur

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**[Turn over**

**34** Lime is made by heating limestone.

Which equation represents this reaction?

**A** $CaCO_3 \rightarrow Ca + O_2 + CO$

**B** $CaCO_3 \rightarrow CaO + CO_2$

**C** $CaCO_3 + H_2O \rightarrow CaO + H_2CO_3$

**D** $CaCO_3 + H_2O \rightarrow Ca(OH)_2 + CO_2$

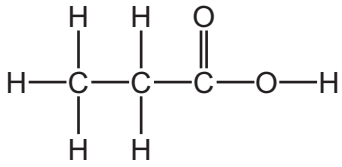
**35** Most objects made from synthetic polymers last for many years.

Why do these polymers last for so long?

| | chemically unreactive | biodegradable |
|---|---|---|
| **A** | no | no |
| **B** | no | yes |
| **C** | yes | no |
| **D** | yes | yes |

**36** The structure of a compound, G, is shown.

G is in the same homologous series as ethanoic acid.

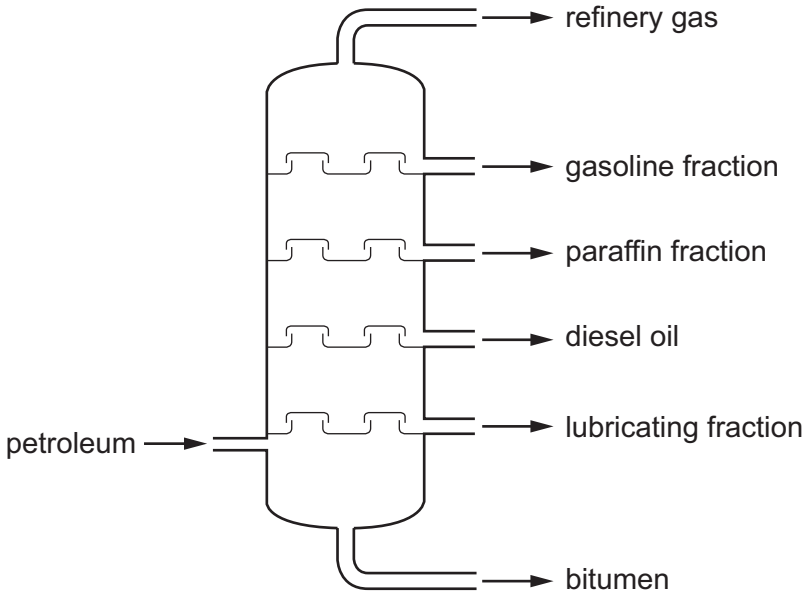


Which row describes some of the properties of an aqueous solution of G?

| | produces a gas with magnesium | turns methyl orange yellow |
|---|---|---|
| **A** | no | yes |
| **B** | no | no |
| **C** | yes | no |
| **D** | yes | yes |

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**37** The fractional distillation of petroleum is shown.




Which fraction is the least volatile?

**A** bitumen

**B** diesel oil

**C** gasoline fraction

**D** refinery gas

**38** Which row shows the properties of methane?

| | soluble in water | state at room temperature | gives a positive test with aqueous bromine |
|---|---|---|---|
| **A** | no | gas | no |
| **B** | no | gas | yes |
| **C** | yes | liquid | no |
| **D** | yes | liquid | yes |

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**[Turn over**

**39** The formulae of five compounds are listed.

1 $C_4H_{10}$

2 $C_2H_5OH$

3 $C_4H_9OH$

4 $C_4H_9COOH$

5 $C_5H_{11}OH$

Which compounds are in the same homologous series?

**A** 1, 3 and 4 only

**B** 2, 3 and 5 only

**C** 3 and 4 only

**D** 3 and 5 only

**40** Which process is used to make an alkene from a long-chain alkane?

**A** combustion

**B** condensation

**C** cracking

**D** polymerisation

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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.).