



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY

0620/12

Paper 1 Multiple Choice (Core)

May/June 2018

45 minutes

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

* 8 0 5 3 9 3 3 2 7 5 1 *

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 When iodine is heated it turns from a solid to a gas.

When liquid ammonia is cooled it turns into a solid.

When ice is heated it turns into water.

Which terms describe these changes of state?

| | when iodine is heated | when liquid ammonia is cooled | when ice is heated |
|----------|-----------------------|-------------------------------|--------------------|
| A | boiling | freezing | melting |
| B | freezing | sublimation | boiling |
| C | sublimation | condensation | freezing |
| D | sublimation | freezing | melting |

- 2 Which piece of apparatus **cannot** be used to collect and measure the volume of gas produced in an experiment?

- A** burette
B gas syringe
C measuring cylinder
D pipette

- 3 Pure ethanol has a melting point of $-114\text{ }^{\circ}\text{C}$ and a boiling point of $78\text{ }^{\circ}\text{C}$.

What are the melting and boiling points of a sample of ethanol with glucose dissolved in it?

| | melting point/ $^{\circ}\text{C}$ | boiling point/ $^{\circ}\text{C}$ |
|----------|-----------------------------------|-----------------------------------|
| A | -116 | 77 |
| B | -116 | 79 |
| C | -112 | 77 |
| D | -112 | 79 |

- 4 Which atom has an equal number of protons, neutrons and electrons?

- A** ^{40}Ar **B** ^1H **C** ^{23}Na **D** ^{14}N

5 Which description of brass is correct?

- A alloy
- B compound
- C element
- D non-metal

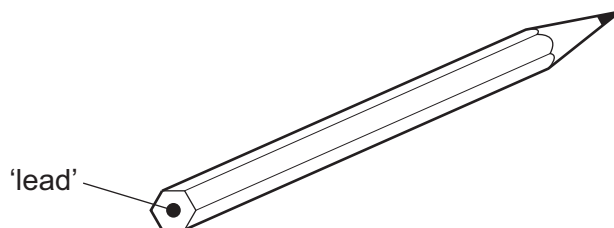
6 The bonding between elements X and Y in compound XY_2 is shown.



Which row shows the type of bond in XY_2 and the type of element X?

| | type of bond | type of element X |
|----------|--------------|-------------------|
| A | covalent | metal |
| B | covalent | non-metal |
| C | ionic | metal |
| D | ionic | non-metal |

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



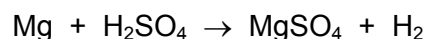
When the percentage of graphite is increased, the pencil slides across the paper more easily.

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 non-metal.

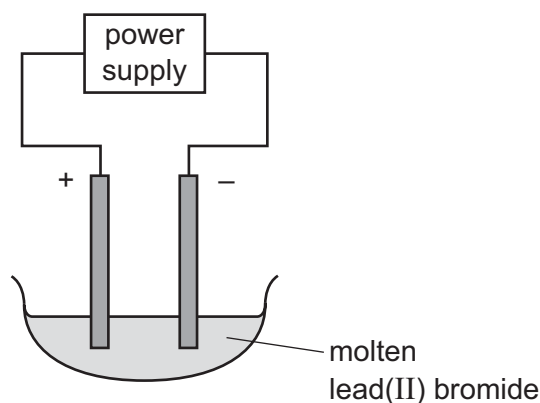
- 8 The equation for the reaction between magnesium and dilute sulfuric acid is shown.

The M_r of $MgSO_4$ is 120.



Which mass of magnesium sulfate is formed when 12g of magnesium completely reacts with dilute sulfuric acid?

- A** 5g **B** 10g **C** 60g **D** 120g
- 9 The electrolysis of molten lead(II) bromide is shown.



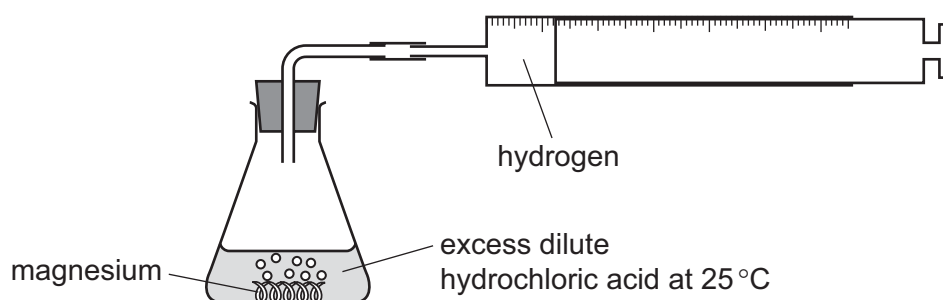
Which statement describes what happens at the negative electrode?

- A** Bromide ions gain electrons to form bromine molecules.
B Bromine molecules gain electrons to form bromide ions.
C Lead atoms lose electrons to form lead ions.
D Lead ions gain electrons to form lead atoms.
- 10 Which statement about the combustion of fuels is correct?
- A** It always produces carbon dioxide.
B It always produces carbon monoxide.
C It is always endothermic.
D It is always exothermic.

11 Which statement about chemical reactions is correct?

- A Endothermic reactions show a temperature decrease because energy is absorbed from the surroundings.
- B Endothermic reactions show a temperature increase because energy is released into the surroundings.
- C Exothermic reactions show a temperature increase because energy is absorbed from the surroundings.
- D Exothermic reactions show a temperature decrease because energy is released into the surroundings.

12 The diagram shows a rate of reaction experiment.

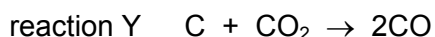
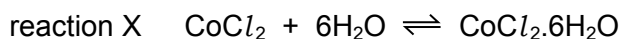


Increasing the concentration of the acid and increasing the temperature both affect the rate of reaction.

Which row is correct?

| | increase the concentration of acid | increase the temperature |
|----------|------------------------------------|---------------------------|
| A | decrease rate of reaction | decrease rate of reaction |
| B | decrease rate of reaction | increase rate of reaction |
| C | increase rate of reaction | decrease rate of reaction |
| D | increase rate of reaction | increase rate of reaction |

13 Reaction X shows a test for water. Reaction Y occurs in the blast furnace for extracting iron.

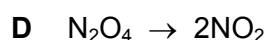
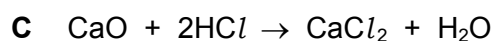
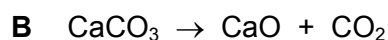
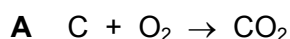


Reaction X is1..... . In reaction Y, the oxide CO_2 is2..... .

Which words correctly complete gaps 1 and 2?

| | 1 | 2 |
|----------|--------------|----------|
| A | irreversible | oxidised |
| B | irreversible | reduced |
| C | reversible | oxidised |
| D | reversible | reduced |

14 Which equation shows an oxidation reaction?



15 Which two gases each give the same result for the test shown?

| | test | gas 1 | gas 2 |
|----------|------------------------|----------|----------|
| A | damp blue litmus paper | ammonia | chlorine |
| B | damp blue litmus paper | ammonia | oxygen |
| C | lighted splint | hydrogen | chlorine |
| D | lighted splint | hydrogen | oxygen |

16 Which statement about oxides is correct?

A A solution of magnesium oxide has a pH less than pH 7.

B A solution of sulfur dioxide has a pH greater than pH 7.

C Magnesium oxide reacts with nitric acid to make a salt.

D Sulfur dioxide reacts with hydrochloric acid to make a salt.

17 Which methods are suitable for preparing **both** zinc sulfate and copper(II) 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, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

18 Two separate tests are done on separate solutions of compound X.

- 1 Addition of aqueous sodium hydroxide forms a green precipitate that dissolves in an excess of aqueous sodium hydroxide.
- 2 Addition of dilute nitric acid and aqueous silver nitrate forms a white precipitate.

What is compound X?

- A** chromium(III) carbonate
- B** chromium(III) chloride
- C** iron(II) carbonate
- D** iron(II) chloride

19 Which statement about the Periodic Table is correct?

- A** Elements in the same group have the same number of electron shells.
- B** It contains elements arranged in order of increasing proton number.
- C** Metals are on the right and non-metals are on the left.
- D** The most reactive elements are at the bottom of every group.

20 Chlorine, bromine and iodine are elements in Group VII of the Periodic Table.

Which statement about these elements is **not** correct?

- A** The colour gets darker down the group.
- B** The density increases down the group.
- C** They are all gases at room temperature and pressure.
- D** They are all non-metals.

21 Which row describes the properties of a transition element?

| | property 1 | property 2 |
|----------|----------------------------|-----------------------------|
| A | forms colourless compounds | acts as a catalyst |
| B | forms colourless compounds | low electrical conductivity |
| C | high density | acts as a catalyst |
| D | high density | low electrical conductivity |

22 Which statement about the elements in Group VIII is correct?

- A** They all form diatomic molecules.
- B** They all have eight electrons in their outer shells.
- C** They all react with oxygen to form oxides.
- D** They are all gases at room temperature.

23 Stainless steel is an alloy of iron, carbon and other metals.

Which row is correct?

| | stainless steel is harder than pure iron | stainless steel resists corrosion better than pure iron |
|----------|--|---|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

24 A student is given metal Z and its oxide.

The student does some experiments to find out the position of metal Z in the reactivity series.

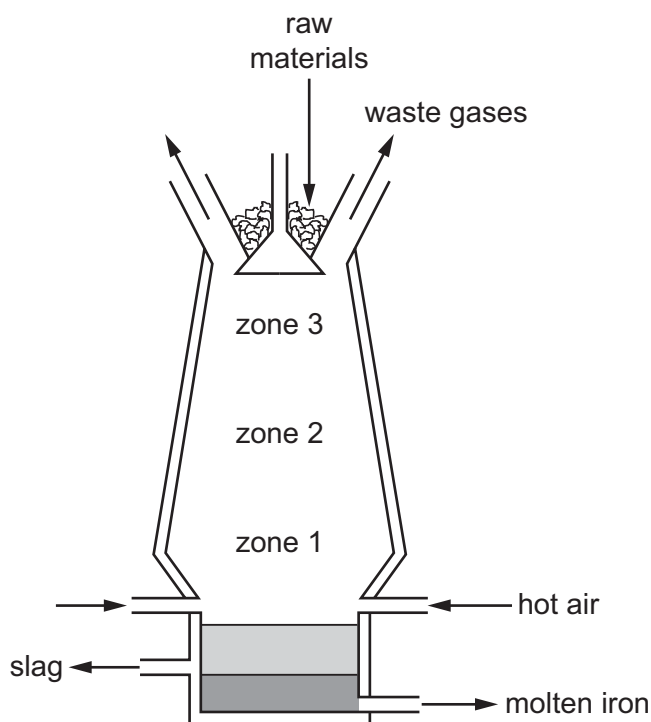
The results are shown.

- Metal Z reacted slowly with dilute hydrochloric acid.
- Metal Z reacted slowly with steam but not with water.
- The oxide of metal Z reacted when heated with carbon.

Which statement about the position of metal Z in the reactivity series is correct?

- A** It is between calcium and sodium.
- B** It is between copper and hydrogen.
- C** It is between hydrogen and iron.
- D** It is between magnesium and calcium.

25 Iron is produced from iron ore in a blast furnace.



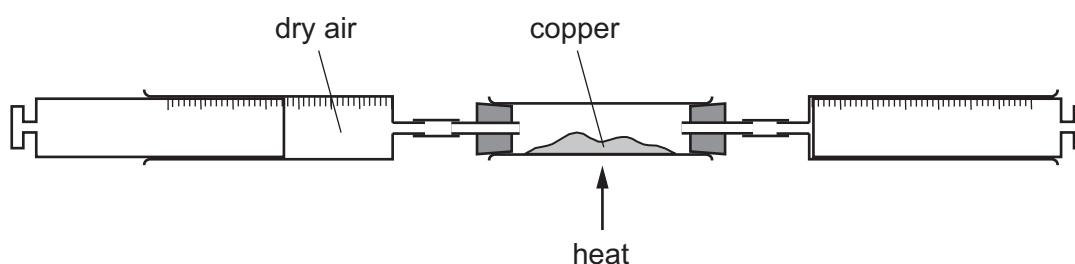
Which equation represents the main reaction that happens in zone 1?

- A** $C(s) + CO_2(g) \rightarrow 2CO(g)$
- B** $C(s) + O_2(g) \rightarrow CO_2(g)$
- C** $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(l) + 3CO_2(g)$
- D** $Fe_3O_4(s) + CO(g) \rightarrow 3FeO(s) + CO_2(g)$

26 Which row describes the use of an alloy and the property upon which the use depends?

| | alloy | use | property |
|----------|-----------------|-----------|-------------------------------|
| A | mild steel | cutlery | resistant to corrosion |
| B | mild steel | machinery | strong |
| C | stainless steel | cutlery | low density |
| D | stainless steel | machinery | good conductor of electricity |

27 Dry air is passed over hot copper until all the oxygen has reacted.



The volume of gas at the end of the reaction is 120 cm^3 .

What is the starting volume of dry air?

- A** 132 cm^3 **B** 152 cm^3 **C** 180 cm^3 **D** 570 cm^3

28 A steel bicycle which had been left outdoors for several months was starting to rust.

What would **not** reduce the rate of corrosion?

- A** Remove the rust and paint the bicycle.
B Remove the rust and store the bicycle in a dry shed.
C Remove the rust and wipe the bicycle with a clean, damp cloth.
D Remove the rust and wipe the bicycle with an oily cloth.

29 Which statements about water are correct?

- 1 Household water contains dissolved salts.
- 2 Water for household use is filtered to remove soluble impurities.
- 3 Water is treated with chlorine to kill bacteria.
- 4 Water is used in industry for cooling.

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

30 Ammonium nitrate is a common fertiliser used by farmers to increase the yield of their crops.

Which compound reacts with ammonium nitrate to form ammonia?

- A** calcium hydroxide
B potassium nitrate
C sodium chloride
D sodium phosphate

31 Which process does **not** release a greenhouse gas?

- A** digestion of food in cows
B reaction between zinc and hydrochloric acid
C respiration by animals
D thermal decomposition of calcium carbonate

32 Which row describes the uses of sulfur and sulfur dioxide?

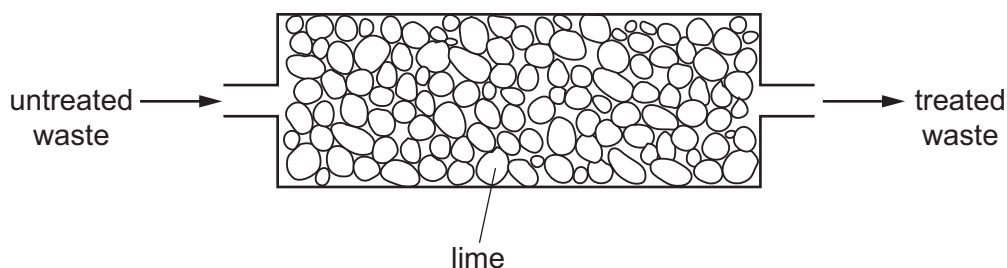
| | sulfur | sulfur dioxide |
|----------|------------------------------|-------------------|
| A | extraction of aluminium | food preservative |
| B | extraction of aluminium | water treatment |
| C | manufacture of sulfuric acid | food preservative |
| D | manufacture of sulfuric acid | water treatment |

33 Limestone is used in many industrial processes.

In which process is it **not** used?

- A manufacture of alkenes
- B manufacture of cement
- C manufacture of iron
- D manufacture of lime

34 Lime is used to treat an industrial waste.



Which change occurs in the treatment?

| | untreated waste | | treated waste |
|----------|-----------------|---|---------------|
| A | acidic | → | neutral |
| B | alkaline | → | acidic |
| C | alkaline | → | neutral |
| D | neutral | → | acidic |

35 What is **not** the correct use of the fraction named?

| | name of fraction | use |
|----------|------------------|------------------------|
| A | fuel oil | making waxes |
| B | gas oil | fuel in diesel engines |
| C | kerosene | jet fuel |
| D | naphtha | making chemicals |

36 Four organic compounds are listed.

ethane

ethanoic acid

ethanol

ethene

Which bond do all four compounds contain?

- A C–C B C–H C C–O D O–H

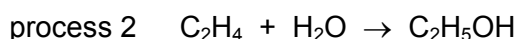
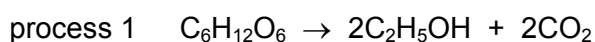
37 Which compounds belong to the same homologous series?

- A ethane and propane
B ethanoic acid and ethanol
C methane and ethene
D propene and ethanoic acid

38 Which substances can be obtained by cracking hydrocarbons?

- A ethanol and ethene
B ethanol and hydrogen
C ethene and hydrogen
D ethene and poly(ethene)

39 The equations for two important processes used to manufacture ethanol are shown.



Which statement is **not** correct?

- A Both processes require a catalyst.
B Both processes use a starting material obtained from petroleum.
C Process 1 shows the production of a renewable fuel.
D Process 2 is an addition reaction.

40 Part of the label on the packet of a potato product is shown.

This potato product contains:
starch
ethanoic acid
sodium chloride
sugar

Which constituent is a natural polymer?

- A ethanoic acid
- B sodium chloride
- C starch
- D sugar

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The Periodic Table of Elements

| | | Group | | | | | | | | | | | | | | | | | | |
|----------------------------|---|----------------------------|---------------------------------|--|------------------------------|-----------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|-------------------------------|---|---|--------------------|------------------------|
| I | II | III | IV | V | VI | VII | VIII | | | | | VIII | | | | | | | | |
| 3 Li lithium 7 | 4 Be beryllium 9 | 11 Na sodium 23 | 12 Mg magnesium 24 | <table border="1"> <thead> <tr> <th colspan="2">Key</th> </tr> <tr> <th>atomic number</th> <th>atomic symbol name relative atomic mass</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>H hydrogen 1</td> </tr> </tbody> </table> | | | | | | | | | | Key | | atomic number | atomic symbol name relative atomic mass | 1 | H hydrogen 1 | 2 He helium 4 |
| Key | | | | | | | | | | | | | | | | | | | | |
| atomic number | atomic symbol name relative atomic mass | | | | | | | | | | | | | | | | | | | |
| 1 | H hydrogen 1 | | | | | | | | | | | | | | | | | | | |
| 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 — | 118 Og oganeson — | 119 Uue unbinilium — | 120 Uuo unbinilium — | 121 Uuq unbinilium — | | | |

| | | | | | | | | | | | | | | | |
|-------------|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| 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 dm³ at room temperature and pressure (r.t.p.).