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

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

Paper 1 Multiple Choice (Core) **October/November 2018**

**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.



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CAMBRIDGE International Examinations

**1** A gas is heated. The pressure is kept constant.

View solution

Which statement describes the behaviour of the particles in the gas?

**A** The particles move faster and become closer together.

**B** The particles move faster and become further apart.

**C** The particles move slower and become closer together.

**D** The particles move slower and become further apart.

**2** In which state does 1 $dm^3$ of methane contain the most particles?

View solution

**A** gas at 100 °C

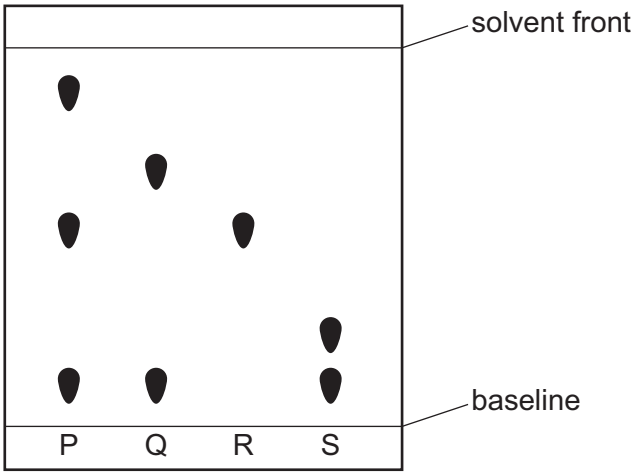
**B** gas at room temperature

**C** liquid

**D** solid

**3** The chromatogram obtained from four mixtures of dyes, P, Q, R and S, is shown.

View solution



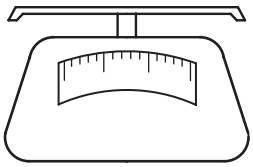

What is the total number of different dyes identified in the four mixtures?

**A** 3 **B** 4 **C** 5 **D** 8

**4** The diagrams show four pieces of laboratory equipment.

View solution

balance



pipette



stop-clock




thermometer



Which equipment is essential to find out if dissolving a salt in water is an exothermic process?

| | balance | pipette | stop-clock | thermometer |
|---|---|---|---|---|
| **A** | ✗ | ✗ | ✗ | ✓ |
| **B** | ✓ | ✗ | ✗ | ✓ |
| **C** | ✗ | ✓ | ✗ | ✓ |
| **D** | ✓ | ✗ | ✓ | ✗ |

**5** How many neutrons are present in the atom $^{45}_{21}X$?

View solution

**A** 21 **B** 24 **C** 45 **D** 66

**6** Strontium nitrate is an ionic compound.

View solution

Cyclohexane is a covalent compound.

Which row describes a property of each compound?

| | strontium nitrate | cyclohexane |
|---|---|---|
| **A** | conducts electricity in aqueous solution | low boiling point |
| **B** | low melting point | insoluble in water |
| **C** | soluble in water | conducts electricity when solid |
| **D** | conducts electricity when solid | high melting point |

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**7** Ionic bonds are formed when elements from Group I and Group VII react together.

View solution

Which statement about ions or ionic compounds is **not** correct?

**A** Electrons from one atom are transferred to another atom to form ions.

**B** Group VII atoms gain electrons to form ions.

**C** Negative ions are formed when atoms lose electrons.

**D** Molten ionic compounds conduct electricity.

**8** What is the relative formula mass of $Mg(OH)_2$?

View solution

**A** 21 **B** 30 **C** 42 **D** 58

**9** Calcium carbonate, $CaCO_3$, reacts with dilute hydrochloric acid to produce carbon dioxide.

View solution

The equation for the reaction is shown. The relative formula mass of calcium carbonate is 100.

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

10 g of calcium carbonate is reacted with an excess of dilute hydrochloric acid.

Which mass of carbon dioxide is produced?

**A** 2.2 g **B** 2.8 g **C** 4.4 g **D** 44 g

**10** Concentrated hydrochloric acid and dilute sulfuric acid were electrolysed in separate experiments using carbon electrodes.

View solution

Which statement is correct for both electrolysis experiments?

**A** Chlorine gas is produced at the positive electrode.

**B** Hydrogen gas is produced at the positive electrode.

**C** Hydrogen gas is produced at the negative electrode.

**D** Oxygen gas is produced at the negative electrode.

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**11** Aqueous nickel(II) sulfate is used as the electrolyte to electroplate a piece of steel with nickel.

View solution

Which materials are used as the negative electrode and positive electrode?

| | negative electrode | positive electrode |
|---|---|---|
| **A** | carbon | steel |
| **B** | nickel | steel |
| **C** | platinum | nickel |
| **D** | steel | nickel |

**12** Which substance does **not** use oxygen to produce heat energy?

View solution

**A** coal

**B** hydrogen

**C** natural gas

**D** uranium

**13** Equal volumes and concentrations of dilute hydrochloric acid and aqueous sodium hydroxide are mixed. The temperatures of the solutions are shown.

View solution

| solution | temperature / °C |
|---|---|
| dilute hydrochloric acid | 26 |
| aqueous sodium hydroxide | 26 |
| mixture of dilute hydrochloric acid and aqueous sodium hydroxide | 33 |

Which statement describes the reaction?

**A** Energy is released and the products have less energy than the reactants.

**B** Energy is released and the products have more energy than the reactants.

**C** Energy is absorbed and the products have less energy than the reactants.

**D** Energy is absorbed and the products have more energy than the reactants.

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**14** A student heats hydrated copper(II) sulfate. The blue crystals change to a white powder.

View solution

How can the student reverse this reaction?

**A** Add anhydrous copper(II) sulfate to the white powder.

**B** Add water to the white powder.

**C** Cool the white powder.

**D** Reheat the white powder.

**15** Which compound is written with the oxidation state (VII)?

View solution

**A** $CuSO_4$ **B** $FeSO_4$ **C** $Fe_2(SO_4)_3$ **D** $KMnO_4$

**16** Magnesium powder reacts with an excess of dilute hydrochloric acid to produce hydrogen gas.

View solution

Which statements about this reaction are correct?

1 The smaller the particles of magnesium powder, the slower hydrogen is produced.

2 The higher the temperature, the faster the magnesium powder disappears.

3 The lower the concentration of dilute hydrochloric acid, the faster the rate of reaction.

4 The faster the magnesium powder disappears, the faster the rate of reaction.

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

**17** In which row are the oxides correctly identified?

View solution

| | acidic | basic |
|---|---|---|
| **A** | magnesium oxide, calcium oxide | sulfur dioxide, carbon dioxide |
| **B** | magnesium oxide, sulfur dioxide | carbon dioxide, calcium oxide |
| **C** | sulfur dioxide, carbon dioxide | calcium oxide, magnesium oxide |
| **D** | sulfur dioxide, magnesium oxide | calcium oxide, carbon dioxide |

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**18** The following steps are done to prepare solid magnesium sulfate.

View solution

1 filtration

2 measurement of 20 $cm^3$ of dilute sulfuric acid using a measuring cylinder

3 evaporation

4 addition of an excess of solid magnesium carbonate to dilute sulfuric acid

What is the correct order for these steps?

**A** $2 \rightarrow 4 \rightarrow 3 \rightarrow 1$

**B** $2 \rightarrow 4 \rightarrow 1 \rightarrow 3$

**C** $4 \rightarrow 2 \rightarrow 1 \rightarrow 3$

**D** $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

**19** When dilute sulfuric acid is added to solid X, a colourless solution is formed and a gas is produced.

View solution

What is X?

**A** copper(II) oxide

**B** sodium oxide

**C** copper(II) carbonate

**D** sodium carbonate

**20** A few drops of methyl orange are added to a reaction mixture.

View solution

During the reaction, a gas is produced and the methyl orange turns from red to orange.

What are the reactants?

**A** aqueous sodium hydroxide and ammonium chloride

**B** aqueous sodium hydroxide and calcium carbonate

**C** dilute hydrochloric acid and magnesium

**D** dilute hydrochloric acid and aqueous sodium hydroxide

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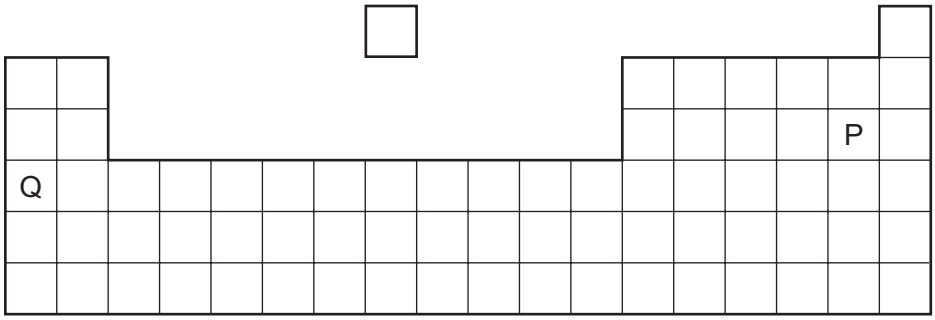
**21** The positions of two elements, P and Q, in the Periodic Table are shown.

View solution




P and Q react together to form a compound.

What is the formula of the compound?

**A** QP **B** $Q_2P$ **C** $Q_7P$ **D** $QP_7$

**22** Elements in Group I of the Periodic Table react with water.

View solution

Which row describes the products made in the reaction and the trend in reactivity of the elements?

| | products | trend in reactivity |
|---|---|---|
| **A** | metal hydroxide and hydrogen | less reactive down the group |
| **B** | metal hydroxide and hydrogen | more reactive down the group |
| **C** | metal oxide and hydrogen | less reactive down the group |
| **D** | metal oxide and hydrogen | more reactive down the group |

**23** The equation shows the reaction between a halogen and aqueous bromide ions.

View solution

$$X_2 + 2Br^- \rightarrow 2X^- + Br_2$$

.....1..... .....2..... .....3.....

Which words complete gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|---|---|---|---|
| **A** | chlorine | brown | colourless |
| **B** | chlorine | colourless | brown |
| **C** | iodine | brown | colourless |
| **D** | iodine | colourless | brown |

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**24** An inert gas R is used to fill weather balloons.

View solution

Which descriptions of R are correct?

| | number of outer shell electrons in atoms of R | structure of gas R |
|---|---|---|
| **A** | 2 | diatomic molecules |
| **B** | 2 | single atoms |
| **C** | 8 | diatomic molecules |
| **D** | 8 | single atoms |

**25** Four metals, W, X, Y and Z, are separately reacted with water and dilute hydrochloric acid.

View solution

The results are shown.

| | metal | | | |
|---|---|---|---|---|
| | W | X | Y | Z |
| reaction with water | fizzes | no reaction | fizzes vigorously | no reaction |
| reaction with dilute hydrochloric acid | fizzes | no reaction | fizzes violently | fizzes |

What is the order of reactivity of the four metals starting with the least reactive?

| | least reactive ⟶ most reactive | | | |
|---|---|---|---|---|
| **A** | X | W | Z | Y |
| **B** | X | Z | W | Y |
| **C** | Y | W | Z | X |
| **D** | Y | Z | W | X |

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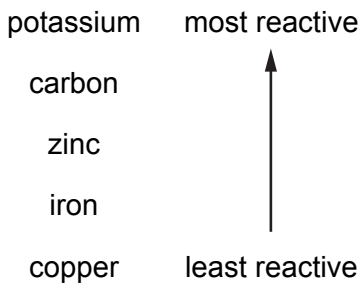
**26** Part of the reactivity series is shown.

View solution




Which metal must be extracted from its ore by electrolysis?

**A** copper

**B** iron

**C** potassium

**D** zinc

**27** Which statement about the uses of metals is **not** correct?

View solution

**A** Aluminium is used in aircraft because of its strength and good electrical conductivity.

**B** Copper is used in electrical wiring because of its good electrical conductivity.

**C** Stainless steel resists corrosion and is used to make cutlery.

**D** Transition elements are often used as catalysts.

**28** Argon is a noble gas used to fill light bulbs.

View solution

What is the approximate percentage of argon in air?

**A** 1% **B** 20% **C** 79% **D** 99%

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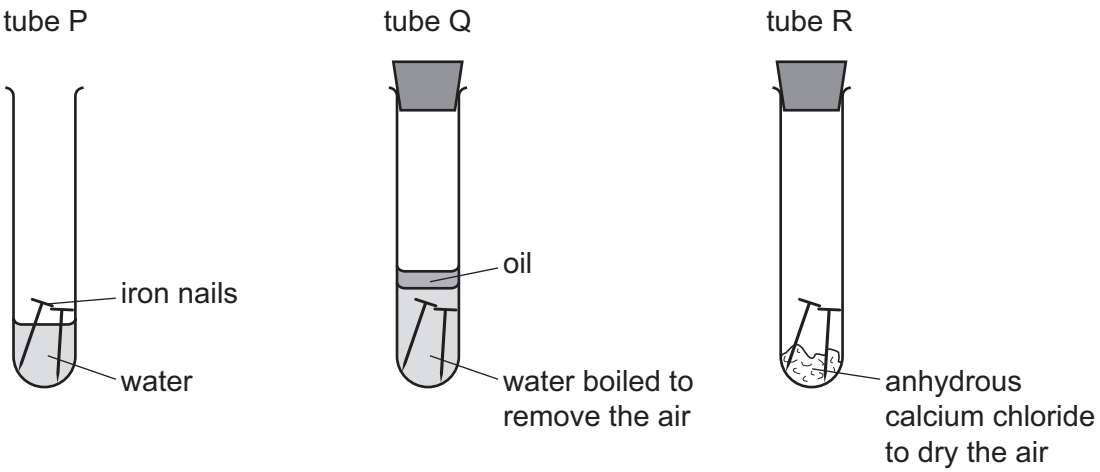
**29** The diagrams show experiments involving the rusting of iron.

View solution




A student predicted the following results.

1 In tube P, the iron nails rust.

2 In tube Q, the iron nails do not rust.

3 In tube R, the iron nails do not rust.

Which predictions are correct?

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

**30** Which statements about sulfur dioxide pollution are correct?

View solution

1 It increases the pH of rivers.

2 It damages limestone buildings.

3 It causes respiratory problems.

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

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**31** The table describes three types of water.

| water type | source of water | appearance before treatment | treatment | appearance after treatment |
|---|---|---|---|---|
| P | river | muddy | none | muddy |
| Q | river | muddy | filtration and chlorination | clear |
| R | well | clear | chlorination only | clear |

Which statement is correct?

View solution

**A** Only Q and R are suitable for drinking, while P could be used for irrigation.

**B** Only Q and R are suitable for drinking, while P is unsuitable for any purpose.

**C** Only Q is suitable for drinking. R could be used for washing cars and P for irrigation.

**D** P, Q and R are suitable for irrigation and washing cars, but are not suitable for drinking.

**32** Which compound would **not** be used as an important part of a garden fertiliser?

View solution

**A** $Ca_3(PO_4)_2$ **B** $KNO_3$ **C** $Mg(OH)_2$ **D** $(NH_4)_2SO_4$

**33** Carbon dioxide and methane both contribute to climate change.

View solution

Which process produces both gases?

**A** complete combustion of natural gas

**B** farming cattle

**C** heating calcium carbonate

**D** respiration

**34** What is **not** a use of lime?

View solution

**A** It is used as a bleach in the manufacture of wood pulp.

**B** It is used to desulfurise flue gases.

**C** It is used to neutralise acidic industrial waste.

**D** It is used to treat acidic soil.

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**35** Petroleum is a mixture of different hydrocarbons.

View solution

Which process is used to separate the petroleum into groups of similar hydrocarbons?

**A** combustion

**B** cracking

**C** fractional distillation

**D** reduction

**36** Which two compounds are molecules which both contain a double bond?

View solution

**A** ethane and ethanoic acid

**B** ethane and ethanol

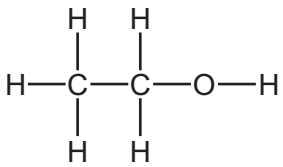
**C** ethene and ethanoic acid

**D** ethene and ethanol

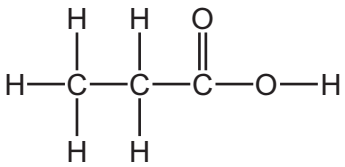
**37** Which molecule does **not** belong to the alcohol homologous series?

View solution

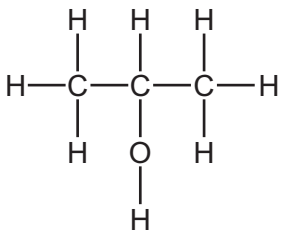
**A**



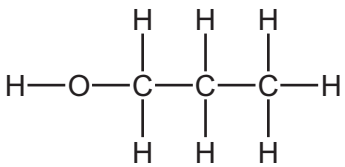
**B**



**C**



**D**



**38** Ethanol can be formed by:

View solution

1 fermentation

2 reaction between steam and ethene.

Which of these processes use a catalyst?

| | 1 | 2 |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**39** Ethanoic acid is a weak acid.

View solution

Which statements about ethanoic acid are correct?

1 It turns Universal Indicator purple.

2 It reacts with magnesium to form hydrogen gas.

3 It reacts with calcium carbonate to form carbon dioxide gas.

4 It decolourises aqueous bromine.

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

**40** Which substance is a natural polymer?

View solution

**A** ethene

**B** glucose

**C** nylon

**D** protein

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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.).