Cambridge Assessment International Education

# Cambridge IGCSE™

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

Paper 1 Multiple Choice (Core) **October/November 2021**

**45 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

**INSTRUCTIONS**

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

**INFORMATION**

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.



IB21 11_0620_12/2RP
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**1** Which row describes what happens to the particles in solid iodine when it is heated and turned into a gas?

View solution

| | separation of particles | speed of particles |
|---|---|---|
| **A** | closer together | faster |
| **B** | closer together | slower |
| **C** | further apart | faster |
| **D** | further apart | slower |

**2** A student put exactly 25.00 $cm^3$ of dilute hydrochloric acid into a conical flask.

View solution

The student added 2.5 g of solid sodium carbonate and measured the change in temperature of the mixture.

Which apparatus does the student need to use?

**A** balance, measuring cylinder, thermometer

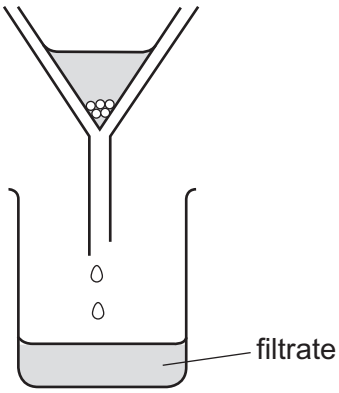
**B** balance, pipette, stopwatch

**C** balance, pipette, thermometer

**D** burette, pipette, thermometer

**3** A student separates sugar from pieces of broken glass by dissolving the sugar in water and filtering off the broken glass.

View solution




What is the filtrate?

**A** broken glass only

**B** broken glass and sugar solution

**C** pure water

**D** sugar solution

**4** How many protons, neutrons and electrons are there in one atom of the isotope $^{27}_{13}Al$?

View solution

| | protons | neutrons | electrons |
|---|---|---|---|
| **A** | 13 | 13 | 13 |
| **B** | 13 | 14 | 13 |
| **C** | 14 | 13 | 13 |
| **D** | 14 | 14 | 13 |

**5** Which description of brass is correct?

View solution

**A** alloy

**B** compound

**C** element

**D** non-metal

**6** Rubidium is in Group I and iodine is in Group VII of the Periodic Table.

View solution

Which row describes what happens when rubidium and iodine react together to form rubidium iodide?

| | rubidium | iodine |
|---|---|---|
| **A** | each atom gains one electron | each atom loses one electron |
| **B** | each atom loses one electron | each atom gains one electron |
| **C** | each atom loses more than one electron | each atom gains more than one electron |
| **D** | each atom neither gains nor loses an electron | each atom neither gains nor loses an electron |

**7** Which row shows the properties for an ionic compound?

View solution

| | volatility | electrical conductivity when solid |
|---|---|---|
| **A** | high | good |
| **B** | high | poor |
| **C** | low | good |
| **D** | low | poor |

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**8** Which substance is described as a macromolecule?

View solution

**A** ammonia

**B** graphite

**C** iron

**D** sodium chloride

**9** The formula of sodium chlorate(V) is $NaClO_3$.

View solution

What is the relative formula mass of sodium chlorate(V), $NaClO_3$?

**A** 52.0 **B** 74.5 **C** 106.5 **D** 223.5

**10** Iron can be electroplated with zinc to make it resistant to corrosion.

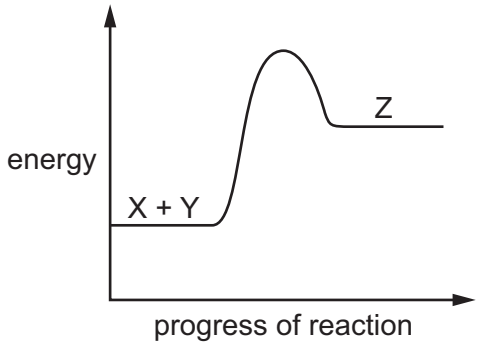
View solution

Which row about electroplating iron with zinc is correct?

| | positive electrode (anode) | negative electrode (cathode) | electrolyte |
|---|---|---|---|
| **A** | iron | zinc | iron nitrate |
| **B** | iron | zinc | zinc nitrate |
| **C** | zinc | iron | iron nitrate |
| **D** | zinc | iron | zinc nitrate |

**11** An energy level diagram for the reaction between substance X and substance Y to form substance Z is shown.

View solution




Which statement is correct?

**A** Energy is released as substance Z is formed.

**B** Substance Z has more energy than substance X and substance Y.

**C** The reaction is exothermic.

**D** When substance X and substance Y react, the temperature increases.

**12** Which reactions are exothermic?

View solution

1 $C + O_2 \rightarrow CO_2$

2 $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

3 $2H_2 + O_2 \rightarrow 2H_2O$

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

**13** Solid copper(II) carbonate reacts with dilute sulfuric acid.

View solution

$$CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + CO_2 + H_2O$$

The rate of the reaction can be changed by varying the conditions.

Which changes always increase the rate of this chemical reaction?

1 increasing the concentration of sulfuric acid

2 increasing the size of the pieces of copper(II) carbonate

3 increasing the temperature

4 increasing the volume of sulfuric acid

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

**14** When a piece of marble is added to hydrochloric acid, bubbles of carbon dioxide gas are given off.

View solution

Which method is used to find the rate of the reaction?

**A** counting the number of gas bubbles formed

**B** measuring the diameter of the gas bubbles

**C** measuring the speed at which the gas bubbles rise upwards through the acid

**D** measuring the time taken for 10 $cm^3$ of gas to be collected

**15** Solid X is heated strongly.

View solution

The colour of the solid changes from blue to white.

What is solid X?

**A** anhydrous cobalt(II) chloride

**B** calcium carbonate

**C** hydrated copper(II) sulfate

**D** lead(II) bromide

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**16** What happens to a chemical substance when it is reduced?

View solution

**A** It burns.

**B** It decomposes.

**C** It loses oxygen.

**D** It gains mass.

**17** Which statements about acids and bases are correct?

View solution

1 An acid reacts with a metal to give off hydrogen.

2 A base reacts with an ammonium salt to give off ammonia.

3 An acid reacts with a carbonate to give off carbon dioxide.

4 Alkaline solutions are orange in methyl orange.

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

**18** Oxide 1 is a solid that reacts with dilute hydrochloric acid.

View solution

Oxide 2 is a gas that reacts with sodium hydroxide solution.

What are the formulae of the oxides?

| | oxide 1 | oxide 2 |
|---|---|---|
| **A** | CaO | MgO |
| **B** | MgO | $NO_2$ |
| **C** | $NO_2$ | $SO_2$ |
| **D** | $SO_2$ | CaO |

**19** In the preparation of zinc sulfate crystals, excess zinc oxide is added to dilute sulfuric acid.

View solution

Why is an excess of zinc oxide added?

**A** to make sure crystals are formed and not powder

**B** to avoid filtering the mixture

**C** to use up all of the sulfuric acid

**D** to use up all of the zinc oxide

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**20** Which statement about aqueous sodium hydroxide is correct?

View solution

**A** When it is added to a solution containing sulfate ions, a white precipitate is formed.

**B** When it is added to a solution of copper(II) ions, a blue precipitate is formed which dissolves in excess to give deep blue solution.

**C** When it is added to a solution of iron(II) ions, a green precipitate is formed which does not dissolve in excess.

**D** When it is added to ammonium chloride, a gas is produced which turns blue litmus red.

**21** A period of the Periodic Table is shown.

View solution

| group | I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|---|
| element | R | S | T | V | W | X | Y | Z |

The letters are not their chemical symbols.

Which statement is correct?

**A** Element R does not conduct electricity.

**B** Elements R and Y react together to form an ionic compound.

**C** Element Z exists as a diatomic molecule.

**D** Element Z reacts with element T.

**22** Which statement about the elements in Group VII of the Periodic Table is correct?

View solution

**A** Chlorine can displace bromine from bromides.

**B** Group VII elements are all solids at room temperature.

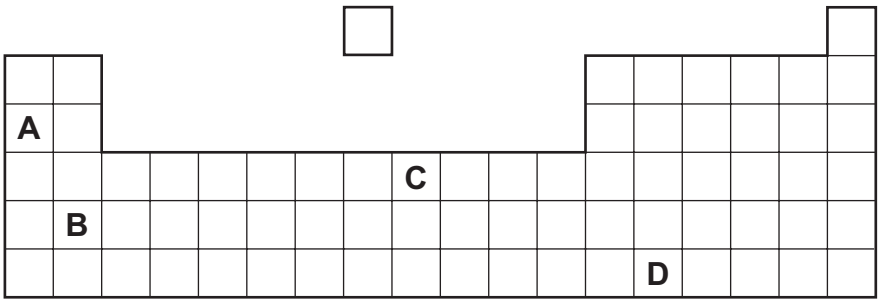
**C** Group VII elements occur as monoatomic covalent molecules.

**D** Reactivity increases down Group VII.

**23** Part of the Periodic Table is shown.

View solution

Which element is a transition element?



**24** The noble gases are in Group VIII of the Periodic Table.

View solution

Which statement explains why noble gases are unreactive?

**A** They all have eight electrons in their outer shells.

**B** They all have full outer shells.

**C** They are all gases.

**D** They are all monoatomic.

**25** Which statement is correct for **all** metals?

View solution

**A** They conduct electricity when molten.

**B** They gain electrons when they form ions.

**C** They have a low density.

**D** They have a low melting point.

**26** Which row describes the method of extraction of aluminium and iron from their ores?

View solution

| | aluminium | iron |
|---|---|---|
| **A** | electrolysis | electrolysis |
| **B** | electrolysis | reduction with carbon |
| **C** | reduction with carbon | electrolysis |
| **D** | reduction with carbon | reduction with carbon |

**27** Which statement about metals and their uses is correct?

View solution

**A** Aluminium is used to make food containers because it is resistant to corrosion.

**B** Aluminium is used to make aircraft wings because it is strong and has a high density.

**C** Iron is used to make electrical wires because it is a good insulator of electricity.

**D** Iron is used to make cooking utensils because it is easily recycled.

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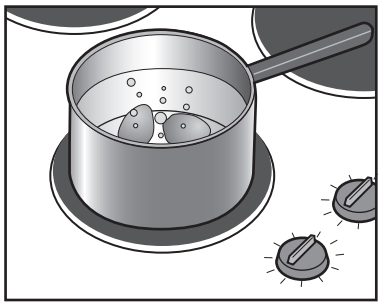
**28** The diagrams show some uses of water in the home.



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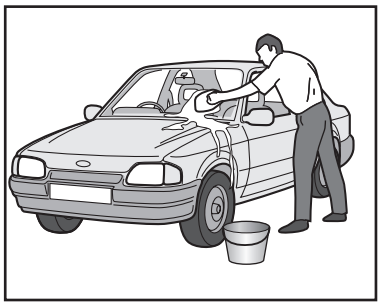


2



3

View solution

For which uses is it important for the water to have been treated?

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

View solution

**29** Four different test-tubes containing water and an iron nail are left for two weeks.

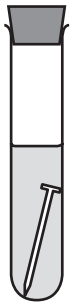
Which nail showed the least amount of rusting?

**A**



tap water

**B**



boiled tap water

**C**



boiled tap water

**D**



tap water

View solution

**30** Which process does **not** produce a greenhouse gas?

**A** acid rain on limestone buildings

**B** combustion of wood

**C** digestion in cows

**D** zinc reacting with sulfuric acid

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**31** Sulfur burns to make sulfur dioxide.

View solution

Which row describes a source of sulfur and a use of sulfur dioxide?

| | source of sulfur | use of sulfur dioxide |
|---|---|---|
| **A** | the air | food preservative |
| **B** | the air | treating acidic soils |
| **C** | underground deposits | food preservative |
| **D** | underground deposits | treating acidic soils |

**32** Lime (calcium oxide) is used to treat waste water from a factory.

View solution

Which substance is removed by the lime?

**A** ammonia

**B** sodium chloride

**C** sodium hydroxide

**D** sulfuric acid

**33** A chemical equation for the complete combustion of methane is shown.

View solution

$$2CH_4 + zO_2 \rightarrow 2CO_2 + 4H_2O$$

What is the value of *z*?

**A** 2 **B** 3 **C** 4 **D** 6

**34** Fuel X produces carbon dioxide and water when it is burned in air. So does fuel Y.

View solution

What could X and Y be?

| | X | Y |
|---|---|---|
| **A** | C | $H_2$ |
| **B** | C | $C_8H_{18}$ |
| **C** | $CH_4$ | $H_2$ |
| **D** | $CH_4$ | $C_8H_{18}$ |

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**35** Which substance is **not** a fossil fuel?

View solution

**A** ethanol

**B** gasoline

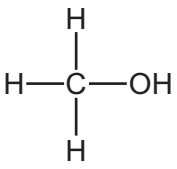
**C** kerosene

**D** methane

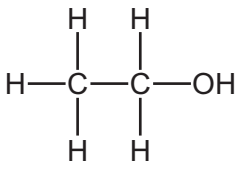
**36** Which compound belongs to a different homologous series to the others?

View solution

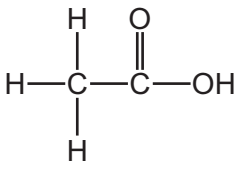
**A**



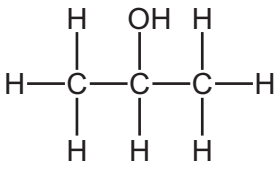
**B**



**C**



**D**



**37** What is a property of aqueous ethanoic acid?

View solution

**A** It changes red litmus blue.

**B** It has a deep purple colour.

**C** It has a pH of less than 7.

**D** It reacts with a metal oxide to form carbon dioxide.

**38** Which statements about unsaturated hydrocarbons are correct?

View solution

1 They contain both single and double bonds.

2 They turn aqueous bromine from colourless to brown.

3 They can be manufactured by cracking.

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

**39** Which substance is used to produce alcohol by fermentation?

View solution

**A** phosphoric acid

**B** platinum

**C** iron

**D** yeast

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**40** Which statements are correct?

View solution

1 Polymers are large molecules built up from monomers.

2 Proteins are natural polymers.

3 Proteins and carbohydrates are constituents of food.

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

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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.).