Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **February/March 2020**

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. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Blank pages are indicated.

1 Which row represents the particles of a gas colliding most frequently?

	pressure	temperature
A	high	high
B	high	low
C	low	high
D	low	low

2 Which test is used to show that a sample of water is pure?

A Evaporate the water to see if any solids remain.

B Heat the water to check its boiling point.

C Test with anhydrous cobalt(II) chloride.

D Use universal indicator paper to check its pH.

3 Which piece of apparatus is used to measure 1.5 cm^3 of a solution accurately?

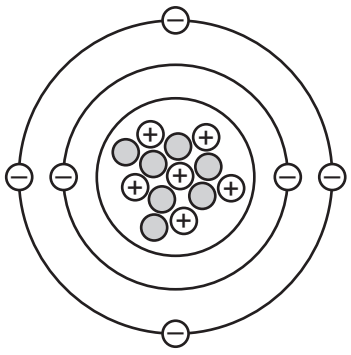
A 25 cm^3 measuring cylinder

B 25 cm^3 pipette

C 50 cm^3 measuring cylinder

D 50 cm^3 burette

4 A representation of an atom is shown.



What is the nucleon number of this atom?

A 6 **B** 7 **C** 12 **D** 13

5 Lithium reacts with fluorine to form the compound lithium fluoride.

Which statement about this reaction is correct?

A Each fluorine atom gains one electron.

B Each fluorine atom gains two or more electrons.

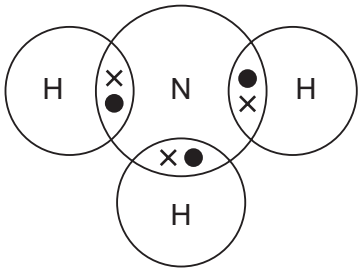
C Each fluorine atom loses one electron.

D Each fluorine atom loses two or more electrons.

6 Ammonia, NH_3, is a covalent molecule.

Which diagram shows the outer shell electron arrangement in a molecule of ammonia?

A



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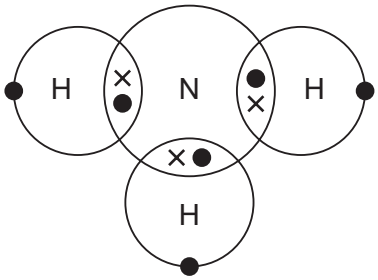

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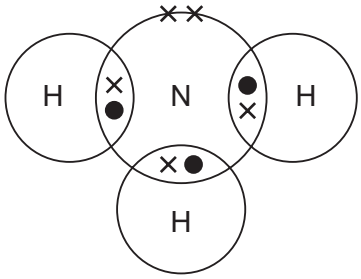

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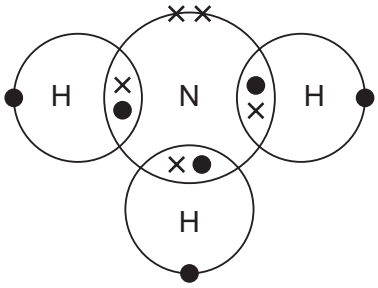


7 Which row describes the structure and a use of diamond?

	structure	use
A	ionic	in cutting tools
B	ionic	lubricant
C	macromolecular	in cutting tools
D	macromolecular	lubricant

8 Methane, CH_4, burns in air to form carbon dioxide and water.

What is the balanced equation for this reaction?

A $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

B $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

C $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + H_2O(g)$

D $CH_4(g) + 3O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

9 Which statement about electrolysis is correct?

A Chemical energy is converted to electrical energy.

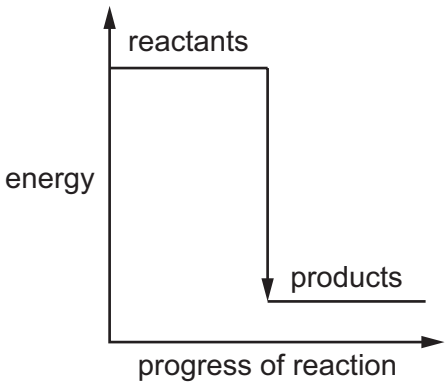
B Electrons flow through the electrolyte.

C Ionic compounds are broken down.

D Metals are formed at the positive electrode.

10 Which energy level diagram shows the reaction that will give out the most energy?

A



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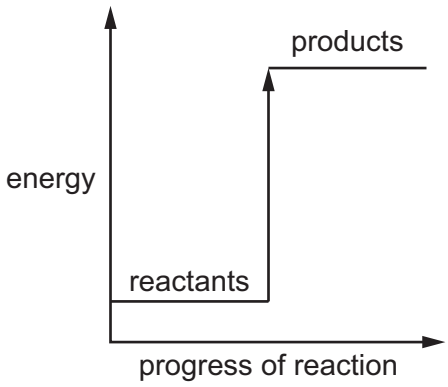

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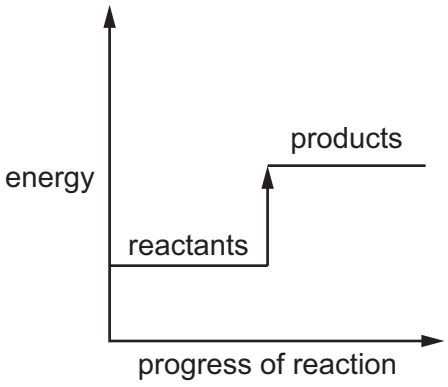

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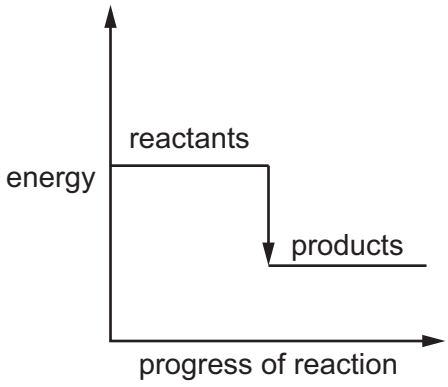


11 Which change is a physical change?

A Copper(II) carbonate changes colour from green to black when it is heated, and stays black when it cools.

B Ethanol reacts with oxygen to form carbon dioxide and water.

C Hydrogen peroxide decomposes into water and oxygen when it is boiled.

D Ice forms liquid water when it is heated.

12 Marble chips (calcium carbonate) react with hydrochloric acid in an exothermic reaction.

calcium carbonate + hydrochloric acid $\rightarrow$ calcium chloride + water + carbon dioxide

When excess marble chips are added to dilute hydrochloric acid the rate of the reaction starts off fast, then gets slower until the reaction stops.

Why does the reaction rate get slower?

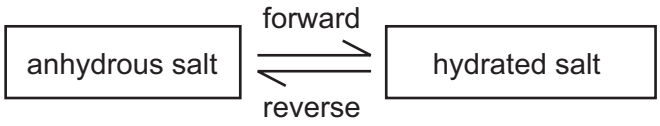
A The concentration of the hydrochloric acid is decreasing.

B The concentration of calcium chloride is increasing.

C The calcium carbonate is completely used up.

D The temperature of the mixture decreases.

13 The diagram shows the change from an anhydrous salt to its hydrated form.



Which statement is correct?

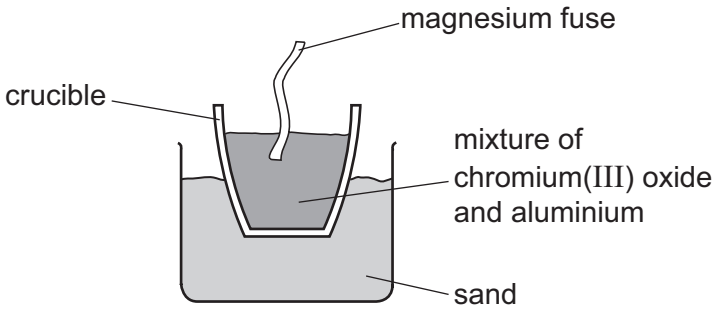
A The forward reaction requires heat and water.

B The forward reaction requires water only.

C The reverse reaction requires heat and water.

D The reverse reaction requires water only.

14 A violent reaction occurs when a mixture of chromium(III) oxide and aluminium is ignited with a magnesium fuse as shown.



The equation for the reaction is shown.

$$Cr_2O_3 + 2Al \rightarrow 2Cr + Al_2O_3$$

Which substance is oxidised in the reaction?

A aluminium

B aluminium oxide

C chromium

D chromium(III) oxide

15 A farmer's soil is acidic.

Which substance should the farmer add to neutralise the soil?

A ammonium sulfate

B calcium oxide

C hydrochloric acid

D NPK fertiliser

16 Three elements, X, Y and Z, are burned in oxygen.

The oxides formed are dissolved in water and the pH of the solutions measured.

The results are shown.

	pH of oxide solution
X	2.0
Y	14.0
Z	8.0

Which statements are correct?

1 Element X could be sulfur.

2 Element Y could be sodium.

3 Element Z is a non-metal.

4 No metal elements were used.

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

17 The following substances can be reacted together to prepare salts.

1 copper(II) oxide and excess hydrochloric acid

2 hydrochloric acid and excess sodium hydroxide

3 hydrochloric acid and excess zinc carbonate

In which reactions can the excess reactant be separated from the solution by filtration?

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

18 Salt S is dissolved in water and three tests are carried out on the solution.

	test	result
1	aqueous sodium hydroxide is added	green precipitate formed, insoluble in excess sodium hydroxide
2	dilute nitric acid is added	no reaction
3	aqueous barium nitrate is added to the acidified solution from test 2	white precipitate formed

What is the identity of S?

A copper(II) chloride

B copper(II) sulfate

C iron(II) chloride

D iron(II) sulfate

19 Which statement about the Periodic Table is correct?

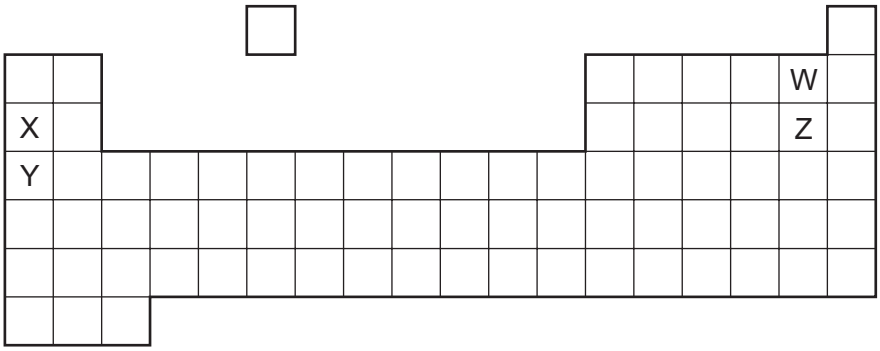
A Most metallic elements are on the left.

B Elements in the same period have the same number of outer electrons.

C Elements on the left are usually gases.

D The relative atomic mass of the elements increases from right to left.

20 The diagram shows elements W, X, Y and Z in a section of the Periodic Table.



Which statement about the reactivity of the elements is correct?

A X is more reactive than Y, and W is more reactive than Z.

B X is more reactive than Y, and Z is more reactive than W.

C Y is more reactive than X, and W is more reactive than Z.

D Y is more reactive than X, and Z is more reactive than W.

21 Some properties of substances are listed.

1 They conduct electricity.

2 They have low densities.

3 They have high melting points.

4 They are malleable.

Which properties are shown by transition metals?

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

22 Which statement about the noble gas argon is correct?

A It burns with a hot flame.

B It is used in airships because of its low density.

C It exists as diatomic molecules.

D It has eight electrons in its outermost shell.

23 Sodium is a Group I metal.

Which property, that is typical of most metals, is **not** shown by sodium?

A conductor of heat

B high melting point

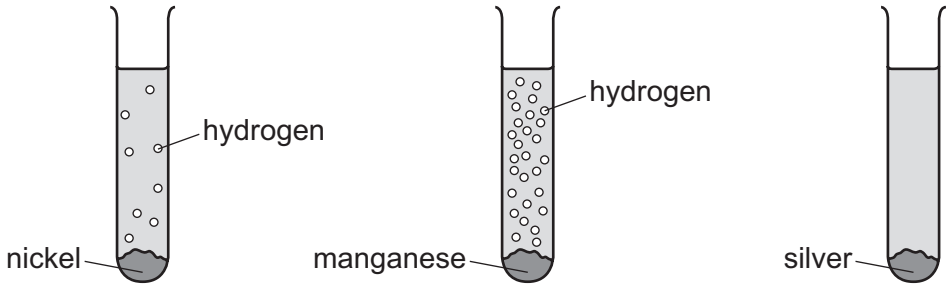
C malleable

D shiny

24 Manganese, nickel and silver are all metals.

Samples of powdered manganese, nickel and silver were placed in separate test-tubes containing dilute hydrochloric acid.

The results are shown.



What is the order of reactivity of the metals, most reactive to least reactive?

A manganese → nickel → silver

B manganese → silver → nickel

C silver → manganese → nickel

D silver → nickel → manganese

25 Which statement about aluminium is correct?

A Aluminium is easy to extract from its ore because it is near the bottom of the reactivity series.

B Aluminium is formed when aluminium oxide is heated with carbon.

C Bauxite is an important ore of aluminium.

D Hematite is an important ore of aluminium.

26 Some properties of aluminium are listed.

1 It conducts heat.

2 It has a low density.

3 It is strong.

4 It is resistant to corrosion.

Which of these properties make aluminium suitable for making food containers for chilled food products?

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

27 Water is treated at a waterworks to make it fit to drink.

What is present in the water when it leaves the waterworks?

A bacteria only

B bacteria and insoluble substances

C chlorine compounds only

D chlorine compounds and soluble substances

28 Sulfur dioxide, carbon monoxide and oxides of nitrogen are common gaseous pollutants found in the air.

Which pollutants contribute to acid rain?

A carbon monoxide and sulfur dioxide

B oxides of nitrogen and sulfur dioxide

C oxides of nitrogen only

D sulfur dioxide only

29 Which methods prevent iron from rusting?

	coating with zinc	painting	washing with salt water
A	✓	✓	✓
B	✗	✓	✓
C	✓	✓	✗
D	✓	✗	✗

key

✓ = prevents rusting

✗ = does not prevent rusting

30 Fertilisers are mixtures of different compounds used to increase the growth of crops.

Which pair of substances contain the three essential elements for plant growth?

A ammonium nitrate and calcium phosphate

B ammonium nitrate and potassium chloride

C ammonium phosphate and potassium chloride

D potassium nitrate and calcium carbonate

[Turn over

31 Which process does **not** add a greenhouse gas to the atmosphere?

A burning methane

B decomposition of vegetation

C polymerisation

D respiration

32 Why is sulfur dioxide used as a food preservative?

A It is a gas at room temperature.

B It is used to make sulfuric acid.

C It kills bacteria.

D It reacts with alkalis.

33 Which statements about lime (calcium oxide) and limestone (calcium carbonate) are correct?

1 Limestone is used in the manufacture of iron.

2 Lime is made by heating limestone.

3 Powdered limestone is heated with clay in the production of cement.

4 Limestone causes soil to be acidic.

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

34 The formulae of two organic compounds, P and Q, are shown.

P	Q
$CH_3CH_2CH_2OH$	$CH_3CHCHCH_3$

Which type of organic compounds are P and Q?

	P	Q
A	alcohol	alkane
B	alcohol	alkene
C	carboxylic acid	alkane
D	carboxylic acid	alkene

35 Petroleum is an important raw material that is separated into useful products.

Which terms describe petroleum and the method used to separate it?

	description	separation method
A	compound	cracking
B	compound	fractional distillation
C	mixture	cracking
D	mixture	fractional distillation

36 Which type of compound is a member of a homologous series?

A carbonate

B carboxylic acid

C halogen

D hydroxide

37 Which statements about propene are correct?

1 Propene contains only single bonds.

2 Propene decolourises bromine water.

3 Propene is obtained by cracking.

4 Propene is a hydrocarbon.

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

38 Which row describes the production of ethanol and its properties?

	can be made from glucose	can be made from ethene	is used as a fuel	is used as a solvent
A	✓	✓	✓	✓
B	✓	✗	✓	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

key

✓ = yes

✗ = no

39 Which statements about ethanoic acid are correct?

1 It contains a carbon–oxygen double bond.

2 It contains two carbon atoms.

3 It decolourises bromine water.

4 It contains an –OH group.

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

40 Which polymers are natural polymers?

1 carbohydrates

2 poly(ethene)

3 protein

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

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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.).