Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/13**

Paper 1 Multiple Choice (Core) **October/November 2022**

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.

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This document has **16** pages. Any blank pages are indicated.

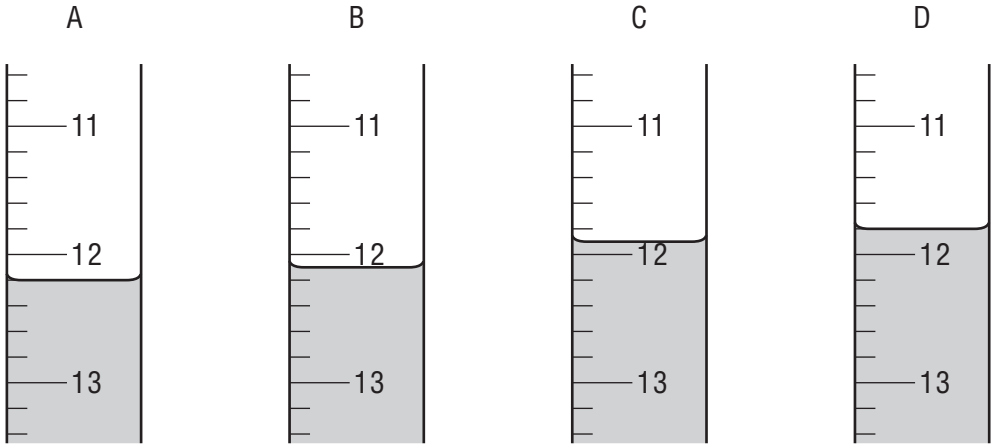
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[Turn over

1 Which row describes the separation and motion of particles in a gas?

	separation of particles	motion of particles
A	close together	slow movement
B	close together	fast movement
C	widely spaced	slow movement
D	widely spaced	fast movement

2 Which burette shows a reading of 12.1 cm^3?



3 A solution of sodium chloride is mixed with a solution of silver nitrate.

A white precipitate of silver chloride and a colourless solution of sodium nitrate are formed.

Which method is used to separate the silver chloride from the mixture?

A crystallisation

B distillation

C filtration

D use of a solvent

4 Which two particles have the same electronic structure?

A C and O^{2-}

B F^- and Na

C K^+ and S^{2-}

D Mg and Na^+

5 Which statement about an alloy is correct?

A It is a compound made of two or more elements, one of which is a metal.

B It is a layer of a metal plated onto another metal.

C It is a mixture of a metal with one or more other elements.

D It is a single element.

6 Magnesium reacts with oxygen to form magnesium oxide.

In the reaction, each magnesium atom .....1..... two .....2..... .

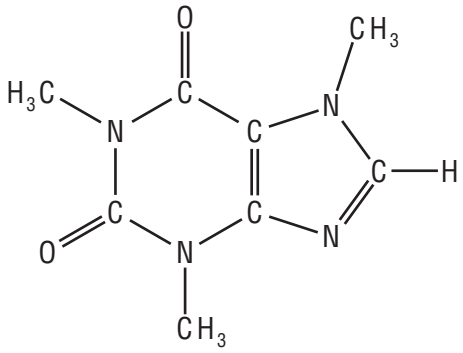
Which words complete gaps 1 and 2?

	1	2
A	loses	electrons
B	loses	protons
C	gains	electrons
D	gains	protons

7 Which row about the structures and uses of diamond and graphite is correct?

	structure	use
A	diamond has a giant covalent structure	diamond is used to make electrodes
B	diamond has a simple covalent structure	diamond is used to make cutting tools
C	graphite has a giant covalent structure	graphite is used as a lubricant
D	graphite has a simple covalent structure	graphite is used to make cutting tools

8 Caffeine is a stimulant found in coffee.



caffeine

Which formula represents caffeine?

A $C_7H_{10}N_4O_2$ **B** $C_8H_{10}N_3O_2$ **C** $C_8H_{10}N_4O_2$ **D** $C_8H_{11}N_4O_2$

9 Iron reacts with sulfuric acid to form iron(II) sulfate.

What is the equation for this reaction?

A $Fe + H_2SO_4 \rightarrow FeSO_4 + 2H$

B $Fe + H_2SO_4 \rightarrow FeSO_4 + H_2$

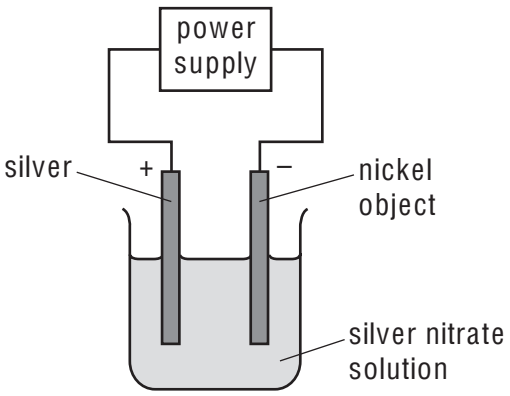
C $Fe + 2H_2SO_4 \rightarrow FeSO_4 + 2H_2O + SO_2$

D $2Fe + H_2SO_4 \rightarrow Fe_2SO_4 + H_2$

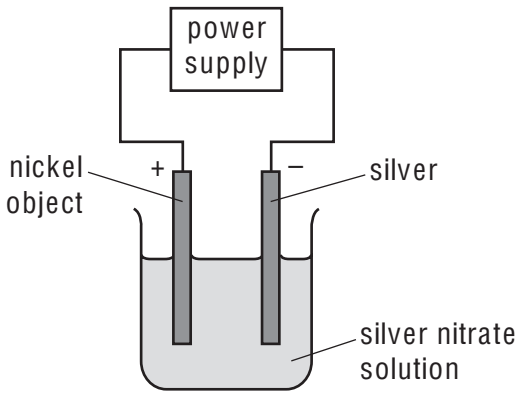
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10 Which apparatus is used to plate a nickel object with silver?

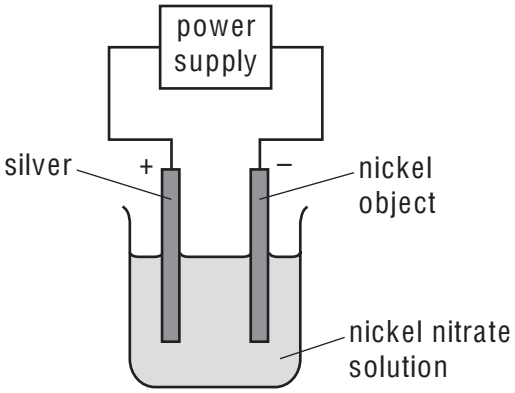
A



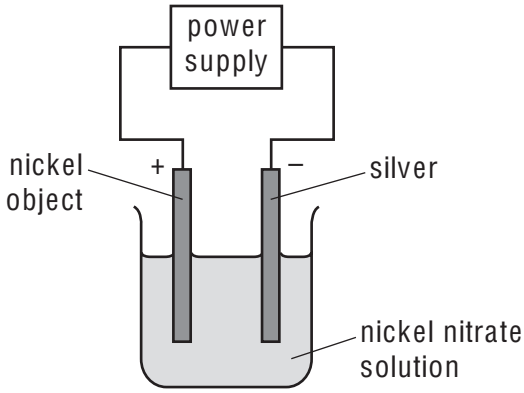
B



C



D



11 When an acid is added to an alkali, the temperature of the reaction mixture rises.

Which words describe this reaction?

A decomposition and endothermic

B decomposition and exothermic

C neutralisation and endothermic

D neutralisation and exothermic

12 Some properties of four fuels are shown.

Which fuel is a gas at room temperature and makes two products when it burns in a plentiful supply of air?

	fuel	formula	melting point / °C	boiling point / °C
A	hydrogen	H_2	–259	–253
B	methane	CH_4	–182	–164
C	octane	C_8H_{18}	–57	126
D	wax	$C_{31}H_{64}$	60	400

13 Which process is a physical change?

A burning wood

B cooking an egg

C melting an ice cube

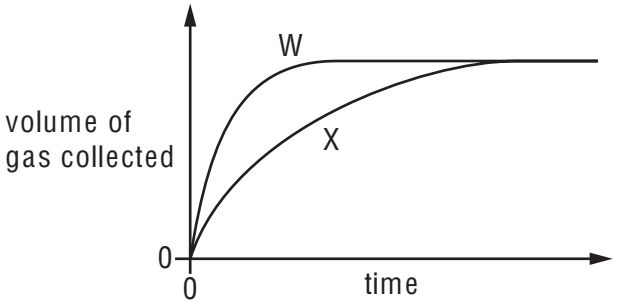
D rusting iron

14 Dilute hydrochloric acid is reacted with excess calcium carbonate and the total volume of gas is measured at regular intervals.

The results are shown by line W on the graph.

The experiment is repeated but with one change.

The results of the second experiment are shown by line X on the graph.



Which change is made in the second experiment?

A A catalyst is added.

B The calcium carbonate is broken into smaller pieces.

C The concentration of the dilute hydrochloric acid is increased.

D The temperature of the dilute hydrochloric acid is decreased.

15 When hydrated copper(II) sulfate is heated, it produces white copper(II) sulfate. When water is added, the white copper(II) sulfate turns blue.

Which type of reaction is shown by these observations?

A decomposition

B displacement

C redox

D reversible

16 When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

17 Which row about sodium oxide and sulfur dioxide is correct?

	sodium oxide	sulfur dioxide
A	acidic	acidic
B	acidic	basic
C	basic	acidic
D	basic	basic

18 Copper(II) sulfate is a soluble compound that is made by reacting copper(II) oxide with dilute sulfuric acid.

This can be completed in the following steps.

1 Add excess copper(II) oxide to dilute sulfuric acid and heat the mixture.

2 Filter off any unreacted copper(II) oxide.

3 Heat to remove most of the water from the filtrate.

4 Leave the solution to cool and filter off the solid copper(II) sulfate which forms.

Which row shows the processes used in this preparation?

	crystallisation	distillation	evaporation
A	✗	✗	✗
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

19 Tests are done on an aqueous solution.

test	a few drops of aqueous sodium hydroxide are added	aqueous sodium hydroxide is added in excess
observation	white precipitate	precipitate dissolves to give a colourless solution

Which cations produce these observations?

1 aluminium, Al^{3+}

2 calcium, Ca^{2+}

3 zinc, Zn^{2+}

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

20 Which statement about the Periodic Table is correct?

A Elements in the same group have the same number of electron shells.

B Elements are 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.

21 Elements E and F are in Group I of the Periodic Table.

E has a higher melting point than F.

Elements J and L are in Group VII of the Periodic Table.

J has a higher density than L.

Which elements have the highest atomic numbers in each group?

A E and J **B** E and L **C** F and J **D** F and L

22 What is a characteristic property of a transition element?

A acts as a catalyst

B low density

C low melting point

D non-conductor of electricity

23 Gas G has 10 electrons. Gas H has eight more electrons than gas G. Both gases are monoatomic.

Which statement about G and H is correct?

A Both gases are in the same group of the Periodic Table.

B Both gases are in the same period of the Periodic Table.

C Both gases are very reactive.

D Gas G has a higher atomic mass than gas H.

24 Which statements about the metals zinc, magnesium, iron and sodium are correct?

1 They all conduct electricity.

2 They all have high melting points and boiling points.

3 They all form negative ions.

4 They all react with dilute acids to form hydrogen.

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

25 Which statement about the reactions of metals is correct?

A Iron and carbon dioxide are produced when iron(III) oxide is heated with carbon.

B Magnesium reacts with dilute hydrochloric acid producing hydrogen and chlorine.

C Potassium reacts vigorously with water producing hydrogen and an acidic solution.

D Zinc reacts with dilute sulfuric acid producing sulfur dioxide.

26 Which metal is obtained by heating its oxide with carbon?

A aluminium

B calcium

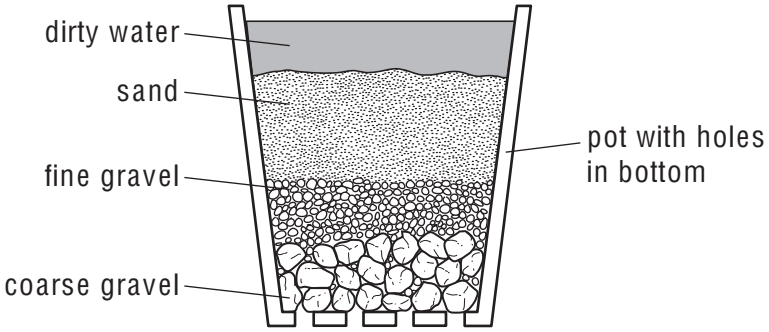
C magnesium

D zinc

27 Which row links the property of the stated metal with its use?

	metal	property	use
A	aluminium	does not corrode	food containers
B	copper	high strength	chemical plant
C	mild steel	good conductor of electricity	electrical wiring
D	stainless steel	low density	aircraft

28 The diagram shows a stage in the purification of dirty water.



Which process does this apparatus show?

A chlorination

B condensation

C distillation

D filtration

29 Which substance in polluted air damages stonework and kills trees?

A carbon dioxide

B carbon monoxide

C lead compounds

D sulfur dioxide

30 A farmer has four different compounds that are used in fertilisers.

	name of compound	formula of compound
1	potassium nitrate	KNO_3
2	ammonium phosphate	$(NH_4)_3PO_4$
3	ammonium nitrate	NH_4NO_3
4	urea	$(NH_2)_2CO$

Which two compounds are mixed to make an NPK fertiliser?

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

31 Waste vegetables are placed in a sealed container with air and left for a number of days.

Bacteria cause the vegetables to decompose. During the decomposition the bacteria respire.

What happens to the concentration of carbon dioxide and methane in the air in the container?

	concentration of carbon dioxide	concentration of methane
A	decreases	decreases
B	does not change	increases
C	increases	does not change
D	increases	increases

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

A helium

B hydrogen

C iron

D sulfur

33 Which substance gives off carbon dioxide on heating?

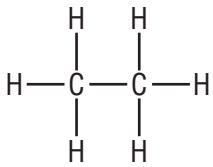
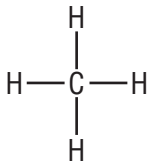
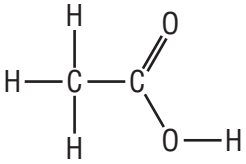
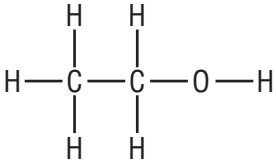
A lime

B limestone

C limewater

D slaked lime

34 Which rows show the correct name for the structure shown?

	structure	name
1		ethene
2		methane
3		ethanol
4		ethanoic acid

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

35 Fuel oil and naphtha are two fractions obtained from petroleum.

What are the major uses of these fractions?

	fuel oil	naphtha
A	jet fuel	making chemicals
B	jet fuel	making roads
C	ship fuel	making chemicals
D	ship fuel	making roads

36 Which statement explains why members of the same homologous series have similar chemical properties?

A There are covalent bonds in all the molecules.

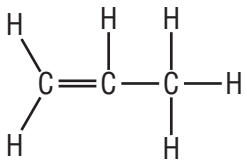
B There are only carbon and hydrogen atoms in all the molecules.

C There is the same number of carbon atoms in all the molecules.

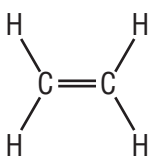
D There is the same functional group in all the molecules.

37 Which molecules are unsaturated hydrocarbons?

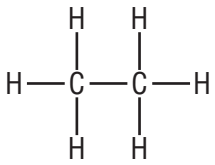
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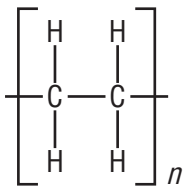
2



3



4



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

38 The results of tests carried out on an organic compound are shown.

test	result
appearance	colourless liquid
effect of adding aqueous bromine	no reaction
effect of applying a lighted splint	burns
effect of adding litmus	turns red

What is the organic compound?

A ethane

B ethanoic acid

C ethanol

D ethene

39 Which word equation represents a reaction that occurs with ethanoic acid?

A ethanoic acid + calcium carbonate → salt + carbon dioxide

B ethanoic acid + copper → salt + hydrogen

C ethanoic acid + magnesium → salt + hydrogen

D ethanoic acid + sodium hydroxide → salt + oxygen

40 Four substances are listed.

1 carbohydrate

2 ethanol

3 protein

4 sodium chloride

Which substances are natural polymers?

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

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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.).

PMT