Cambridge Assessment International Education

Cambridge IGCSE™

CHEMISTRY **0620/11**

Paper 1 Multiple Choice (Core) **May/June 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.

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1 Nitrogen is heated in a balloon, which expands slightly.

Which statements about the molecules of nitrogen are correct?

1 They move further apart.

2 They move more quickly.

3 They remain the same distance apart.

4 Their speed remains unchanged.

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

2 Which piece of apparatus should be used to measure exactly 21.4 cm^3 of water?

A 25 cm^3 beaker

B 25 cm^3 pipette

C 50 cm^3 burette

D 50 cm^3 measuring cylinder

3 Which method of separation is used to separate a soluble solid from its solution?

A chromatography

B condensation

C crystallisation

D filtration

4 The atomic number and nucleon number of a potassium atom are shown.

	potassium atom
atomic number	19
nucleon number	39

How many protons, neutrons and electrons are in a potassium ion, K^+?

	protons	neutrons	electrons
A	19	20	18
B	19	20	20
C	20	19	18
D	20	19	19

5 Sodium is in Group I of the Periodic Table.

Chlorine is in Group VII of the Periodic Table.

Sodium and chlorine combine to form a compound.

Which statement about the combination of sodium and chlorine atoms is correct?

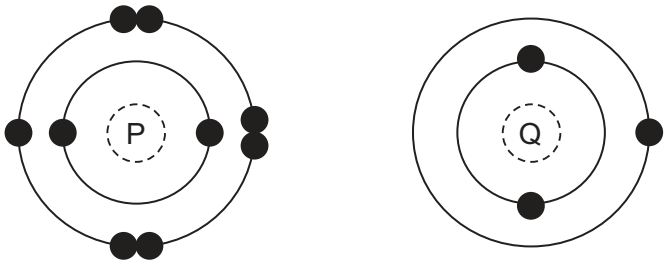
A Both sodium and chlorine lose electrons.

B Both sodium and chlorine gain electrons.

C Sodium loses electrons and chlorine gains electrons.

D Sodium gains electrons and chlorine loses electrons.

6 The electronic structures of two atoms, P and Q, are shown.

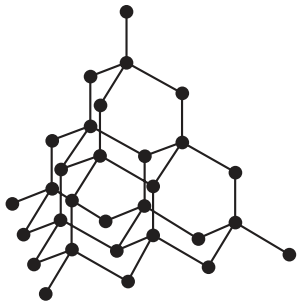


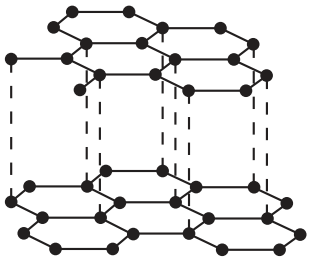
P and Q combine together to form a compound.

What is the type of bonding in the compound and what is the formula of the compound?

	type of bonding	formula
A	ionic	PQ
B	ionic	PQ_2
C	covalent	PQ_2
D	covalent	PQ

7 The structures of diamond and graphite are shown.





Which statement about diamond and graphite is correct?

A Diamond and graphite have low melting points.

B Diamond and graphite have mobile electrons.

C Diamond and graphite have layered structures.

D Diamond and graphite contain strong covalent bonds between carbon atoms.

8 Aluminium oxide has the formula Al_2O_3.

Which statement about aluminium oxide is correct?

A 2 g of aluminium atoms are combined with 3 g of oxygen atoms.

B 2 g of aluminium atoms are combined with 3 g of oxygen molecules.

C Aluminium oxide has a relative formula mass of 102.

D Pure aluminium oxide contains a higher mass of oxygen than of aluminium.

9 Which products are formed when dilute sulfuric acid undergoes electrolysis?

	at the anode	at the cathode
A	oxygen	hydrogen
B	hydrogen	oxygen
C	sulfur dioxide	hydrogen
D	oxygen	sulfur dioxide

10 Which element is **not** used as a fuel?

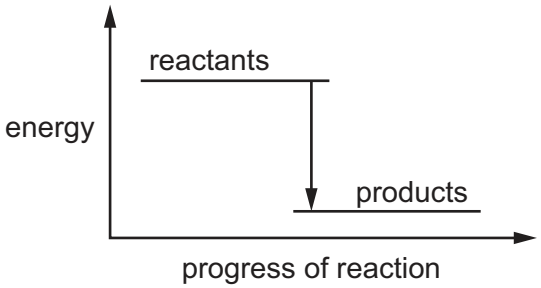
A carbon

B helium

C hydrogen

D uranium

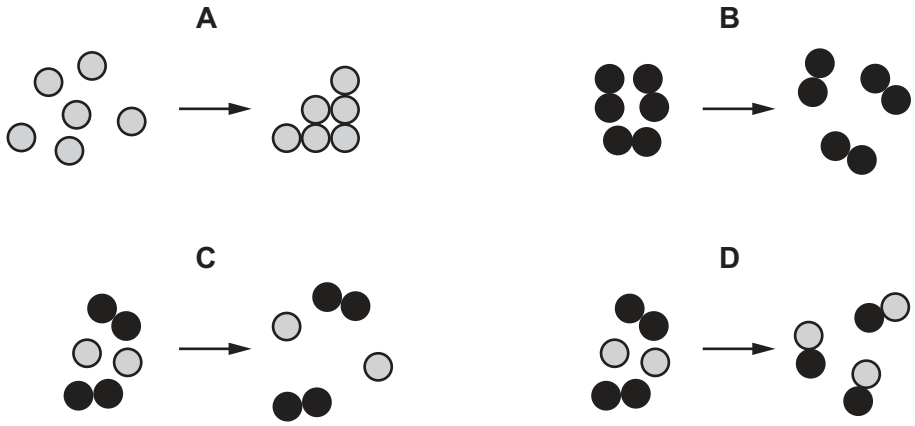
11 The energy level diagram shows the energy of the reactants and products in a chemical reaction.



Which row correctly describes the energy change and the type of reaction shown?

	description of energy change	type of reaction
A	energy is given out to the surroundings	endothermic
B	energy is given out to the surroundings	exothermic
C	energy is taken in from the surroundings	endothermic
D	energy is taken in from the surroundings	exothermic

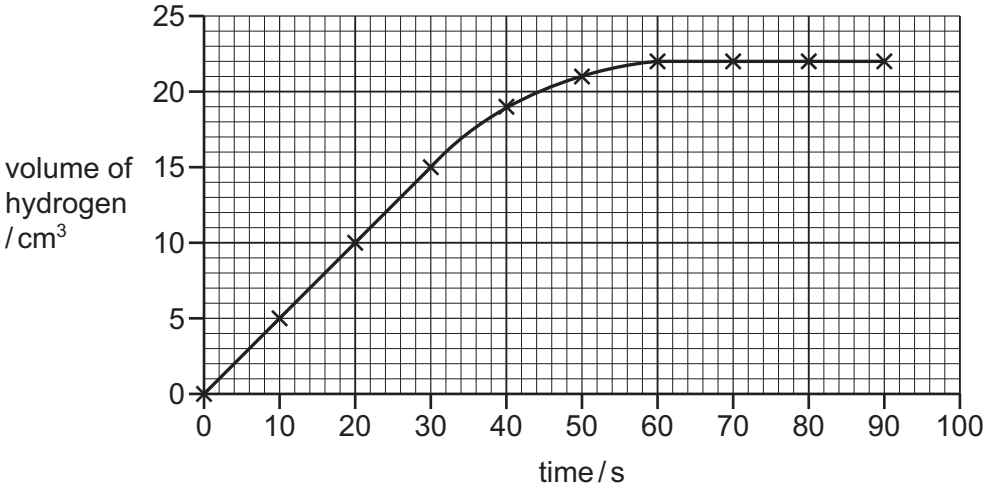
12 Which diagram represents a chemical change?



13 The rate of reaction between magnesium and hydrochloric acid is investigated.

The volume of hydrogen given off at different times is measured.

The results are shown.



Which conclusions are correct?

1 The rate is fastest between 0 and 20 seconds.

2 The maximum volume of hydrogen given off is 22 cm^3.

3 At 40 seconds, 20 cm^3 of hydrogen is given off.

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

14 Which reaction can be easily reversed?

A dissolving zinc in hydrochloric acid

B fermenting glucose with yeast

C heating hydrated cobalt(II) chloride

D the rusting of an iron nail

15 Carbon reacts with silver oxide to form carbon dioxide and silver.

Which substance is reduced?

A carbon

B carbon dioxide

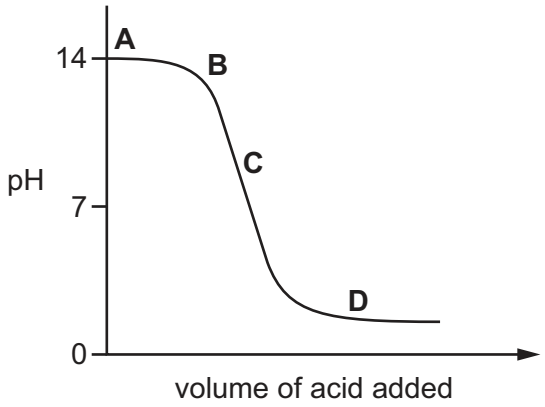
C silver

D silver oxide

16 The graph shows how the pH of a solution changes as an acid is added to an alkali.

$$\text{acid} + \text{alkali} \rightarrow \text{salt} + \text{water}$$

Which letter represents the area of the graph where both acid and salt are present?



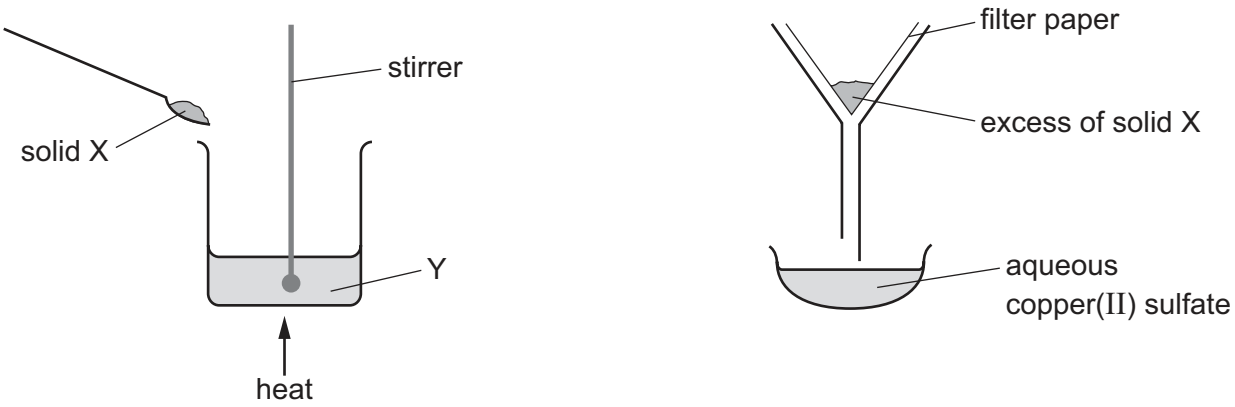
17 Phosphorus is an element in Group V of the Periodic Table.

It burns in air to form an oxide, which dissolves in water to form a solution with a pH of 1.

Which row describes this oxide of phosphorus?

	metal oxide	non-metal oxide	acidic oxide	basic oxide
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

18 The apparatus shown is used to prepare aqueous copper(II) sulfate.



What are X and Y?

	X	Y
A	copper	aqueous iron(II) sulfate
B	copper(II) chloride	dilute sulfuric acid
C	copper(II) oxide	dilute sulfuric acid
D	sulfur	aqueous copper(II) chloride

19 Two tests are carried out on substance Z.

test 1 A flame test produces a red flame.

test 2 Z is dissolved in water and dilute nitric acid is added, followed by aqueous silver nitrate. A yellow precipitate is produced.

What is substance Z?

A lithium bromide

B lithium iodide

C sodium bromide

D sodium iodide

20 The elements in Period 3 of the Periodic Table are shown.

Na	Mg	A*l*	Si	P	S	C*l*	Ar

Which statements about the elements in Period 3 are correct?

1 Na, Mg and A*l* are metals.

2 S, C*l* and Ar are non-metals.

3 Si, P and S are metals.

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

21 A Group I metal (lithium, sodium or potassium) is reacted with a Group VII element (chlorine, bromine or iodine).

Which compound is formed when the Group I metal of highest density reacts with the Group VII element of lowest density?

A lithium chloride

B potassium chloride

C potassium iodide

D lithium iodide

22 The properties of the element titanium, Ti, can be predicted from its position in the Periodic Table.

Which row identifies the properties of titanium?

	can be used as a catalyst	conducts electricity when solid	has low density	forms coloured compounds
A	✓	✓	✓	✗
B	✓	✓	✗	✓
C	✓	✗	✓	✓
D	✗	✓	✓	✓

23 A balloon is filled with helium. Helium is a noble gas and makes the balloon rise up in the air.

The density of air is 1.23 g / dm^3.

Which gas is helium?

	density in g / dm^3	reaction with oxygen
A	0.0899	burns rapidly
B	0.179	does not react with oxygen
C	1.78	does not react with oxygen
D	3.75	does not react with oxygen

24 Which property is shown by **all** metals?

A They are extracted from their ores by heating with carbon.

B They conduct electricity.

C They form acidic oxides.

D They react with hydrochloric acid to form hydrogen.

25 The properties of four metals, W, X, Y and Z, are shown.

W It does not react with cold water but reacts with steam.

X It does not react with water or dilute acid but the oxide of X is reduced by carbon.

Y The oxide of Y is not reduced by carbon but Y reacts vigorously with cold water.

Z It does not react with water or steam but reacts with dilute acid.

What is the order of reactivity of the elements starting with the most reactive?

	most reactive →			least reactive
A	X	W	Z	Y
B	X	Z	W	Y
C	Y	W	Z	X
D	Y	Z	W	X

26 Molten iron from the blast furnace contains impurities.

The process of turning the impure iron into steel involves blowing oxygen into the molten iron and adding calcium oxide.

What are the reasons for blowing in oxygen and adding calcium oxide?

	blowing in oxygen	adding calcium oxide
A	carbon is removed by reacting with oxygen	reacts with acidic impurities making slag
B	carbon is removed by reacting with oxygen	reacts with slag and so removes it
C	iron reacts with the oxygen	reacts with acidic impurities making slag
D	iron reacts with the oxygen	reacts with slag and so removes it

27 Which row describes two uses of the named steel?

	type of steel	uses
A	mild steel	cutlery and car bodies
B	mild steel	car bodies and chemical plant
C	stainless steel	cutlery and chemical plant
D	stainless steel	car bodies and cutlery

28 Which statement shows that a liquid is pure water?

A It boils at 100 °C.

B It has a pH value of 7.

C It turns blue cobalt(II) chloride pink.

D It turns white copper(II) sulfate blue.

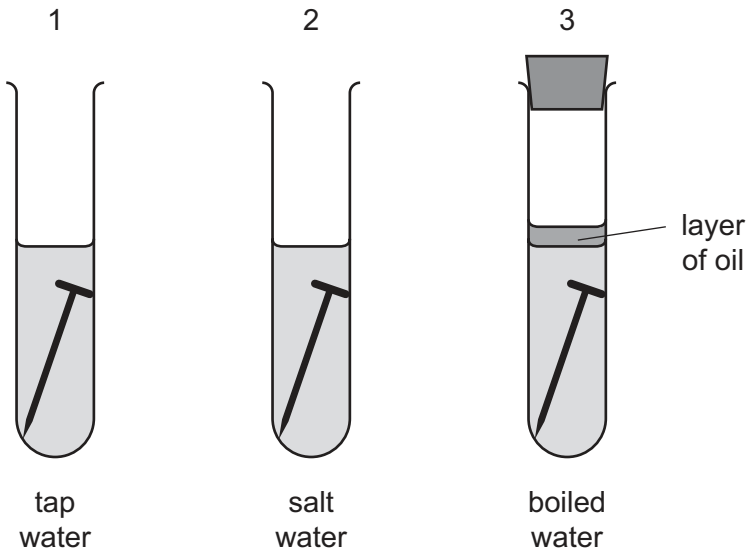
29 Some gases are present in clean air while other gases are only present in polluted air.

Which row is correct?

	a gas present in clean air	a gas **only** present in polluted air
A	argon	carbon dioxide
B	argon	nitrogen dioxide
C	sulfur dioxide	carbon dioxide
D	sulfur dioxide	nitrogen dioxide

[Turn over

30 The diagrams show experiments to investigate rusting of iron nails.



In which test-tubes do the nails rust?

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

31 Which mixture contains all of the elements in a typical fertiliser?

A ammonium nitrate and calcium phosphate

B ammonium phosphate and potassium chloride

C potassium nitrate and ammonium chloride

D potassium carbonate and ammonium nitrate

32 Which processes produce methane?

1 complete combustion of carbon-containing compounds

2 decomposition of vegetation

3 digestion in animals

4 respiration in animals

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

33 The list shows four methods that were suggested for the formation of carbon dioxide.

1 cracking methane using steam

2 action of heat on a carbonate

3 complete combustion of methane

4 reaction of a carbonate with oxygen

Which methods would result in the production of carbon dioxide?

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

34 A student suggests three uses of calcium carbonate (limestone).

1 manufacture of cement

2 manufacture of iron

3 treating alkaline soils

Which suggestions are correct?

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

35 Which list shows the fractions obtained from distilling petroleum, in order of increasing boiling point?

A bitumen → diesel oil → fuel oil → lubricating oil

B diesel oil → gasoline → naphtha → kerosene

C gasoline → naphtha → kerosene → diesel oil

D kerosene → lubricating oil → naphtha → refinery gas

36 Which statement about members of a homologous series is correct?

A They are elements with the same chemical properties.

B They are compounds with the same functional group.

C They are atoms with the same number of outer electrons.

D They are molecules with the same boiling point.

37 Increasing the number of atoms in one molecule of a hydrocarbon increases the amount of energy released when it burns.

What is the correct order?

	less energy released →		more energy released
A	ethene	ethane	methane
B	ethene	methane	ethane
C	methane	ethane	ethene
D	methane	ethene	ethane

38 Which statements about ethanol are correct?

1 Ethanol is made by reacting steam with ethene at 300 °C.

2 Ethanol is made by fermentation at 55 °C.

3 Ethanol burns to produce carbon dioxide and water.

4 Ethanol contains a carbon-carbon double bond.

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

39 Some properties of an organic compound J are listed.

- It is a liquid at room temperature.
- It is soluble in water.
- A solution of J reacts with calcium carbonate to form carbon dioxide.
- A solution of J has a pH of 3.

In which homologous series does J belong?

A alkane

B alkene

C alcohol

D carboxylic acid

40 Which polymers or types of polymer are synthetic?

1 carbohydrates

2 nylon

3 proteins

4 *Terylene*

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

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.).