Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **February/March 2018**

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

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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.

This document consists of **13** printed pages and **3** blank pages.

1 Four physical changes are listed.

1 condensation

2 evaporation

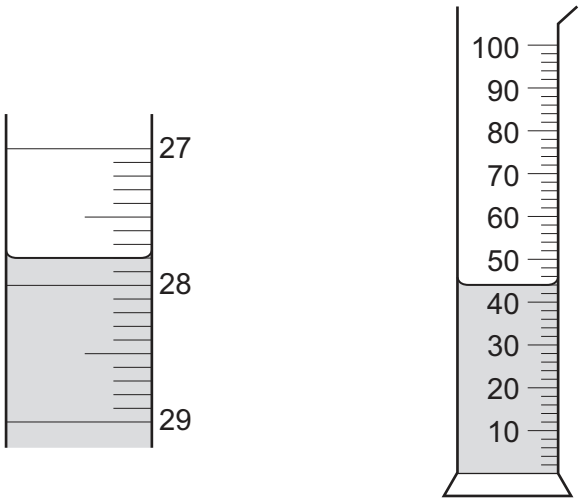
3 freezing

4 sublimation

In which changes do the particles move further apart?

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

2 The diagram shows liquid in a burette and in a measuring cylinder.



burette measuring cylinder

Which row shows the readings for the burette and the measuring cylinder?

	burette	measuring cylinder
A	27.8	42
B	27.8	44
C	28.2	42
D	28.2	44

3 Substance L melts at –7 °C and is a brown liquid at room temperature.

Which temperature is the boiling point of pure L?

A –77 °C

B –7 °C to +7 °C

C 59 °C

D 107 °C to 117 °C

4 A student is given a mixture of barium sulfate, copper(II) sulfate and water.

The table shows information about barium sulfate and copper(II) sulfate.

substance	solubility in water	state at room temperature
barium sulfate	insoluble	solid
copper(II) sulfate	soluble	solid

How does the student obtain copper(II) sulfate crystals from the mixture?

A crystallisation followed by distillation

B crystallisation followed by filtration

C distillation followed by crystallisation

D filtration followed by crystallisation

5 What is the nucleon number of an atom?

A the number of electrons, neutrons and protons in the nucleus

B the number of neutrons and protons in the nucleus

C the number of neutrons in the nucleus

D the number of protons in the nucleus

6 Caesium, Cs, is an element in Group I of the Periodic Table.

When caesium reacts it forms a positive ion, Cs^+.

How is a caesium ion formed?

A A caesium atom gains a proton.

B A caesium atom gains an electron.

C A caesium atom loses an electron.

D A caesium atom shares an electron.

7 Which statement about graphite and diamond is correct?

A Diamond has a high melting point but graphite does not.

B Graphite and diamond both conduct electricity.

C Graphite and diamond both have giant structures.

D Graphite is ionic and diamond is covalent.

8 What is the definition of relative atomic mass, A_r?

A $\left(\frac{\text{average mass of naturally occurring atoms of an element}}{\text{mass of one atom of } {}^{12}\text{C}}\right) \times 12$

B $\left(\frac{\text{average mass of naturally occurring atoms of an element}}{\text{mass of one atom of } {}^{12}\text{C} \times 12}\right)$

C $\left(\frac{\text{average mass of naturally occurring atoms of an element}}{\text{mass of one atom of } {}^{12}\text{C}}\right)$

D $\left(\frac{\text{mass of one atom of } {}^{12}\text{C}}{\text{average mass of naturally occurring atoms of an element}}\right)$

9 Which statement about electrolysis reactions is correct?

A When concentrated aqueous sodium chloride is electrolysed, sodium forms at the cathode.

B When concentrated hydrochloric acid is electrolysed, a green gas forms at the cathode.

C When dilute sulfuric acid is electrolysed, a colourless gas forms at both electrodes.

D When molten lead(II) bromide is electrolysed, lead forms at the anode.

10 Statement 1 Hydrogen is used as a fuel.

Statement 2 When hydrogen burns in the air to form water, heat energy is produced.

Which is correct?

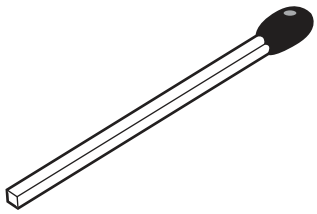
A Both statements are correct and statement 2 explains statement 1.

B Both statements are correct but statement 2 does not explain statement 1.

C Statement 1 is correct but statement 2 is incorrect.

D Statement 2 is correct but statement 1 is incorrect.

11 The diagram shows a match.



By striking the match, a chemical reaction takes place.

Which row describes the chemical reaction?

	type of reaction	reason
A	endothermic	because energy is given out as the match burns
B	endothermic	because energy is used to strike the match
C	exothermic	because energy is given out as the match burns
D	exothermic	because energy is used to strike the match

12 Magnesium carbonate was reacted with dilute hydrochloric acid in a conical flask.

The conical flask was placed on a balance and the mass of the conical flask and contents was recorded as the reaction proceeded.

During the reaction, carbon dioxide gas was produced.

The reaction was done at two different temperatures.

Which row is correct?

	change in mass	temperature at which the mass changed more quickly
A	decrease	higher temperature
B	decrease	lower temperature
C	increase	higher temperature
D	increase	lower temperature

13 Separate samples of anhydrous copper(II) sulfate and hydrated copper(II) sulfate are heated.

Which row shows the correct colour changes?

	anhydrous copper(II) sulfate	hydrated copper(II) sulfate
A	blue to white	white to blue
B	no change	blue to white
C	white to blue	blue to white
D	white to blue	no change

14 In which equation does oxidation of the underlined substance occur?

A $2CuO + C \rightarrow CO_2 + \underline{2Cu}$

B $Fe_2O_3 + \underline{3CO} \rightarrow 2Fe + 3CO_2$

C $2Mg + O_2 \rightarrow \underline{2MgO}$

D $\underline{MnO_2} + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

15 Which property is shown by the alkali sodium hydroxide?

A It has a pH less than pH 7.

B It produces a gas when it is warmed with ammonium chloride.

C It turns blue litmus red.

D It turns Universal Indicator green.

16 A solution of compound Z gives a light blue precipitate with aqueous ammonia. The precipitate dissolves in an excess of ammonia.

A flame test is done on compound Z.

What is the colour of the flame?

A blue-green

B lilac

C red

D yellow

17 Carbon, copper, magnesium, sodium and sulfur can all form oxides.

How many of these elements form acidic oxides?

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

18 Which method is used to make the salt copper(II) sulfate?

A dilute acid + alkali

B dilute acid + carbonate

C dilute acid + metal

D dilute acid + non-metal oxide

19 The Periodic Table lists all the known elements.

Elements are arranged in order of .....1..... number.

The melting points of Group I elements .....2..... down the group.

The melting points of Group VII elements .....3..... down the group.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	nucleon	decrease	increase
B	nucleon	increase	decrease
C	proton	decrease	increase
D	proton	increase	decrease

20 Which statements about Group I and Group VII elements are correct?

1 In Group I, lithium is more reactive than potassium.

2 In Group VII, chlorine is more reactive than fluorine.

	statement 1	statement 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

[Turn over

21 Which statement describes transition elements?

A They have high densities and high melting points.

B They have high densities and low melting points.

C They have low densities and high melting points.

D They have low densities and low melting points.

22 Which trend occurs across the period from sodium to argon?

A a change from metal to non-metal

B an increase in melting point

C a more violent reaction with water

D an increase in electrical conductivity

23 Why is argon used in lamps?

A Argon forms molecules when electricity is passed through it.

B Argon is inert and so does not react with the hot filament.

C Argon is less dense than air.

D Argon produces light when it burns.

24 Metals W, X, Y and Z are reacted with dilute hydrochloric acid.

The oxides of metals W, X, Y and Z are heated with carbon.

The results are shown.

reaction	W	X	Y	Z
metal + dilute hydrochloric acid	fizzing	fizzing	violent fizzing	no reaction
metal oxide + carbon + heat	no reaction	metal produced	no reaction	metal produced

What is the order of reactivity of the metals?

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

25 Iron is extracted from Fe_2O_3 by reduction with carbon.

Aluminium is difficult to extract from Al_2O_3. The process requires electrolysis.

Starting with the most reactive, which order of reactivity is correct?

A $Al \rightarrow C \rightarrow Fe$

B $Al \rightarrow Fe \rightarrow C$

C $Fe \rightarrow Al \rightarrow C$

D $Fe \rightarrow C \rightarrow Al$

26 Which two properties are physical properties of **all** pure metals?

	property 1	property 2
A	brittle	poor conductor of heat
B	good conductor of electricity	malleable
C	good conductor of heat	low melting point
D	malleable	low density

27 Which statement about the uses of aluminium, copper and iron is correct?

A Aluminium is used for aircraft manufacture because it has a high density.

B Aluminium is used for food containers because it is a good conductor of electricity.

C Copper is used for cooking utensils because it is a good conductor of heat.

D Stainless steel is used for car bodies because it corrodes easily.

28 The list gives four experiments done with calcium carbonate.

1 acid added

2 alkali added

3 heated strongly

4 water added

Which experiments produced carbon dioxide?

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

29 Water must be purified before it is suitable for use in the home.

Which processes are used to remove solid impurities and to kill bacteria?

	to remove solid impurities	to kill bacteria
A	chlorination	chlorination
B	chlorination	filtration
C	filtration	chlorination
D	filtration	filtration

30 Which gas is **not** present in clean air?

A argon

B carbon dioxide

C carbon monoxide

D water vapour

31 Which pair of compounds would make an NPK fertiliser?

A ammonium sulfate and potassium phosphate

B calcium hydroxide and ammonium nitrate

C calcium phosphate and potassium chloride

D potassium nitrate and ammonium sulfate

32 Which pollutant gas is produced by the decomposition of vegetation?

A carbon monoxide

B methane

C nitrogen dioxide

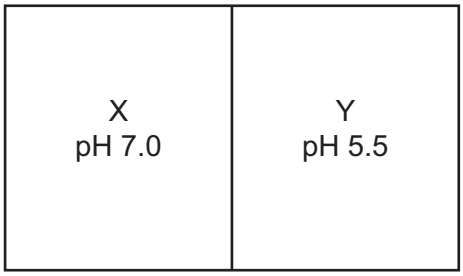
D sulfur dioxide

33 Sulfur burns to make sulfur dioxide.

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	water treatment
C	underground deposits	food preservative
D	underground deposits	water treatment

34 The diagram shows the pH values of the soil in two parts of a garden, X and Y.



Lime is used to neutralise the soil in one part of the garden.

To which part of the garden should the lime be added and why?

	part of the garden	because lime is
A	X	acidic
B	X	basic
C	Y	acidic
D	Y	basic

35 Which substance is **not** used as a fuel?

A ethanol

B hydrogen

C methane

D oxygen

36 Which formula represents an alkene?

A CH_4 **B** C_2H_4 **C** C_2H_6 **D** C_2H_5OH

37 Three chemical reactions are shown.

1 catalytic addition of steam to ethene

2 combustion of ethanol

3 fermentation of glucose

In which of the reactions does the relative molecular mass of the carbon-containing compound decrease?

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

38 How is ethanol produced by fermentation?

A using anaerobic conditions at 30 °C

B using anaerobic conditions at 450 °C

C using steam at 30 °C

D using steam at 450 °C

39 A compound has the formula CH_3COOH.

What is **not** a property of this compound?

A It has a smell like vinegar.

B It reacts with acids to form salts.

C It reacts with magnesium to produce hydrogen.

D It turns blue litmus red.

40 Which statement about polymers is correct?

A Polymers are formed by breaking down monomers.

B Polymers can be natural or synthetic.

C Polymers contain atoms of only one element.

D Polymers have a giant ionic structure.

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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.).