



Rewarding Learning

General Certificate of Secondary Education
2019

Centre Number

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Candidate Number

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Chemistry

Unit 3: Practical Skills

Practical Booklet B

Foundation Tier

MV18

[GCM32]

WEDNESDAY 19 JUNE, MORNING

Time

1 hour, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write on blank pages.

Complete in black ink only.

Answer **all five** questions.

Information for Candidates

The total mark for this paper is 70.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

A Data Leaflet including a Periodic Table of the Elements is provided.

Quality of written communication will be assessed in Question **1(a)**.

(b) State two ways in which the end-point is determined accurately. [2 marks]

1. _____

2. _____

(c) A rough titration and two subsequent accurate titrations were carried out. The table below gives the results of the titrations and the average titre is recorded below the table.

	Initial burette reading (cm ³)	Final burette reading (cm ³)	Titre (cm ³)
Rough titration	0.0	21.2	21.2
First accurate titration	21.2	41.4	20.2
Second accurate titration	25.2	45.2	20.0

Average titre = 20.1 cm³

(i) Why is a rough titration carried out? [1 mark]

(ii) State the colour change at the end-point.
[2 marks]

From _____

to _____

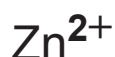
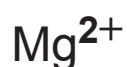
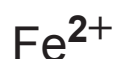
(iii) Write a word equation for the reaction between sodium hydroxide and sulfuric acid. [2 marks]

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- 2 (a) A solution of an ionic compound, labelled A, was tested as shown in the table below.

Test	Observations
1. Place approximately 5 cm ³ of solution A in a test tube and add a few drops of sodium hydroxide solution	white precipitate
2. Add excess sodium hydroxide solution to the test tube from test 1	white precipitate is soluble forming a colourless solution
3. Place approximately 5 cm ³ of solution A in a test tube and add a few drops of silver nitrate solution	cream precipitate
4. Place approximately 5 cm ³ of solution A in a test tube and add a few drops of ammonia solution	white precipitate
5. Add excess ammonia solution to the test tube from test 4	white precipitate is soluble forming a colourless solution

- (i) Circle the formula of the cation present in solution A.
[1 mark]



(ii) Circle the formula of the anion present in solution A.
[1 mark]



(iii) Write the name and formula of the ionic compound dissolved in solution A. [2 marks]

Name: _____

Formula: _____

(iv) Name the white precipitate formed in test 4.
[1 mark]

(b) An unknown solid is thought to be potassium sulfate.

- (i)** Describe how a flame test is carried out on the solid to prove that potassium ions are present.
[4 marks]

- (ii)** Describe the procedure you would use to prove that the solid contains sulfate ions. [3 marks]

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(Questions continue overleaf)

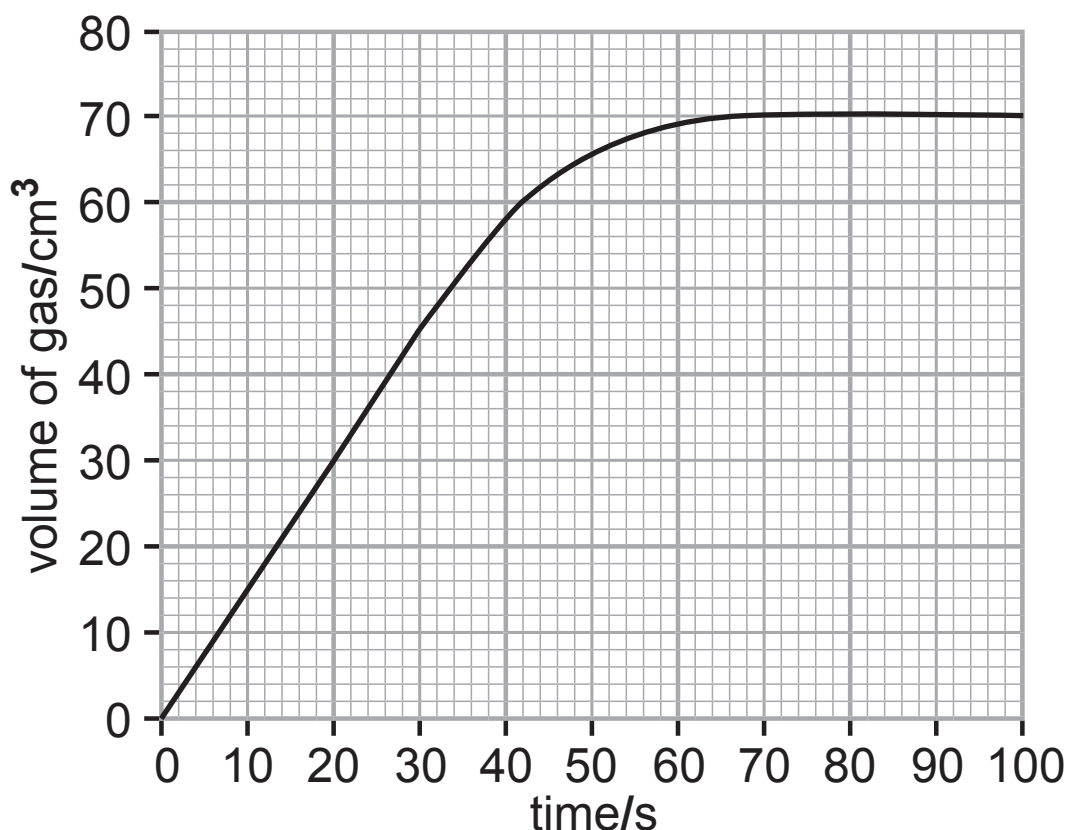
3 0.5 g of zinc were reacted with 25.0 cm³ of hydrochloric acid in a conical flask at 25 °C. The volume of gas produced was recorded every 10 seconds using a gas syringe.

(a) (i) Draw a labelled diagram of the assembled apparatus which would be used to carry out the experiment and measure the volume of gas produced.

[4 marks]

(ii) Write a balanced symbol equation for the reaction between zinc and hydrochloric acid. [3 marks]

(b) The volume of gas produced was plotted against time as shown below.



(i) Explain why the graph levelled off. [1 mark]

(ii) The experiment was repeated at 40°C. Sketch a graph on the axes above which would be obtained at 40°C with all other factors being the same. [1 mark]

(iii) What was the total volume of gas produced during the experiment? [1 mark]

(iv) At what time did the reaction finish? [1 mark]

4 The reactivity of metals varies greatly. Many different reactions of metals may be used to determine a reactivity series.

(a) Five metals were reacted with dilute nitric acid. The initial temperature of the nitric acid was recorded before the metal was added. The highest temperature during the reaction was also recorded. The results are shown in the table below.

Metal	Initial temperature (°C)	Highest temperature (°C)	Temperature change (°C)
zinc	20	25	5
copper	20	20	0
magnesium	20	39	
iron	20	23	
tin	20	21	

(i) Complete the table. [1 mark]

(ii) The reactivity series of four of the metals is given below. Place tin in this reactivity series. [1 mark]

Most reactive: magnesium

 zinc

 iron

Least reactive: copper

(iii) Explain how the data in the table shows that the reaction of magnesium and nitric acid is exothermic. [1 mark]

(iv) State two factors which should be kept the same during this experiment. [2 marks]

1. _____

2. _____

(v) Write a balanced symbol equation for the reaction of magnesium with nitric acid. [3 marks]

(b)

Metal	magnesium nitrate	zinc nitrate	iron(II) nitrate	copper(II) nitrate	tin(II) nitrate	chromium(III) nitrate	cobalt(II) nitrate
chromium	X	X	✓	✓	✓		✓
cobalt	X	X	X	✓	✓	X	

A series of displacement reactions was carried out with two other metals, chromium and cobalt. The results are shown in the table on page 14. A tick (✓) indicates that a reaction occurs.

(i) Place a tick (✓) in the right hand box for the correct statements below. [2 marks]

Chromium is more reactive than cobalt

Cobalt is more reactive than chromium

Cobalt is more reactive than copper and tin

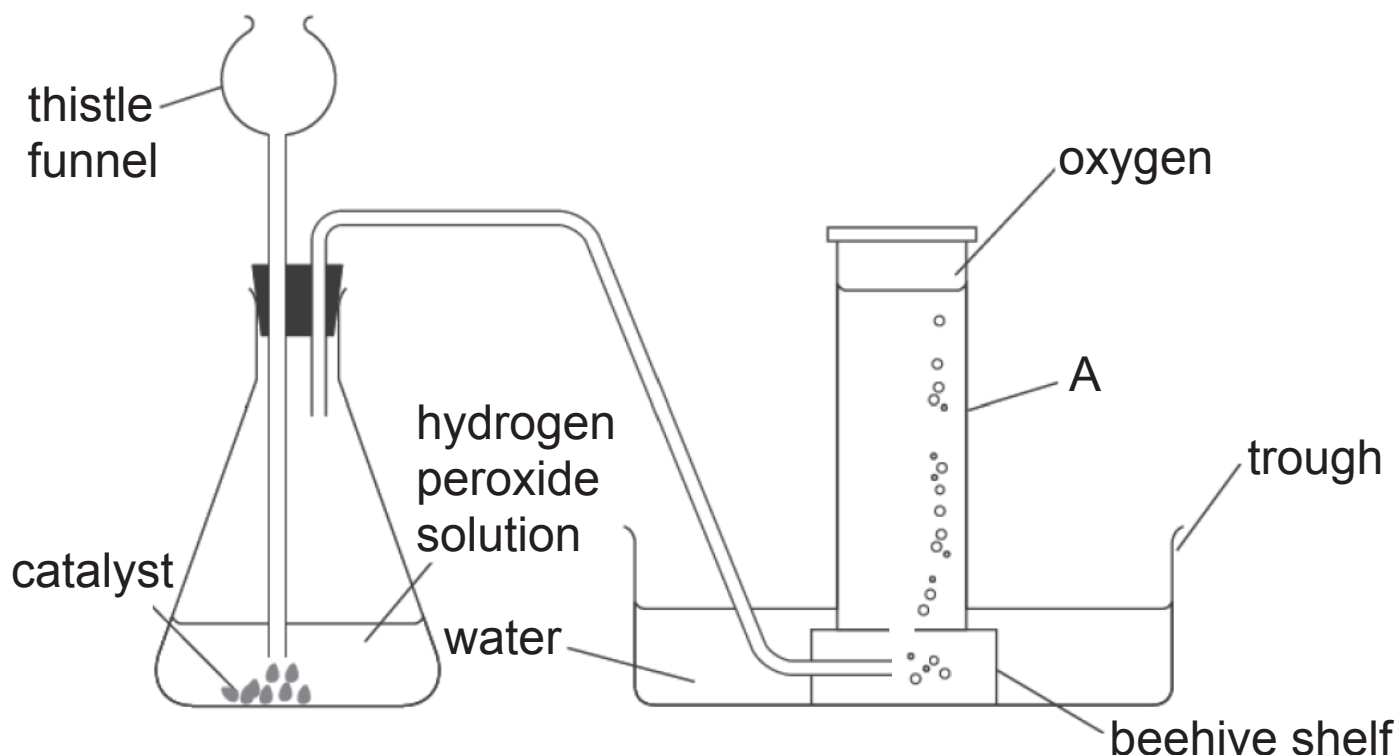
Chromium is more reactive than iron and less reactive than zinc

(ii) Name the two products of the reaction of cobalt and copper(II) nitrate. [2 marks]

(iii) Write the formula for chromium(III) nitrate. [1 mark]

5 Oxygen, ammonia and carbon dioxide are gases at room temperature and pressure.

(a) The apparatus below is used to prepare and collect oxygen gas from the catalytic decomposition of hydrogen peroxide solution. The gas is collected over water.

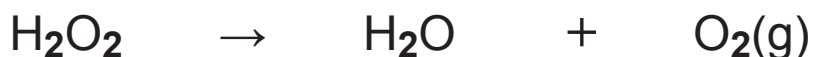


(i) Name the piece of apparatus labelled A. [1 mark]

(ii) Explain why the bottom of the thistle funnel has to be below the level of the hydrogen peroxide solution in the conical flask. [1 mark]

(iii) State one physical property of oxygen which allows it to be collected in this way. [1 mark]

(iv) The symbol equation below is for the decomposition of hydrogen peroxide. Balance the equation and add the missing state symbols. [2 marks]



(v) Name the catalyst used for the decomposition of hydrogen peroxide. [1 mark]

(vi) What is meant by the term catalyst? [2 marks]

(vii) Describe how you would test for oxygen gas. [2 marks]

(b) Ammonia gas is pungent and very soluble in water.

(i) Complete the passage below which describes the test for ammonia gas. Use the terms below.
[3 marks]

blue

hydrochloric acid

white

smoke

precipitate

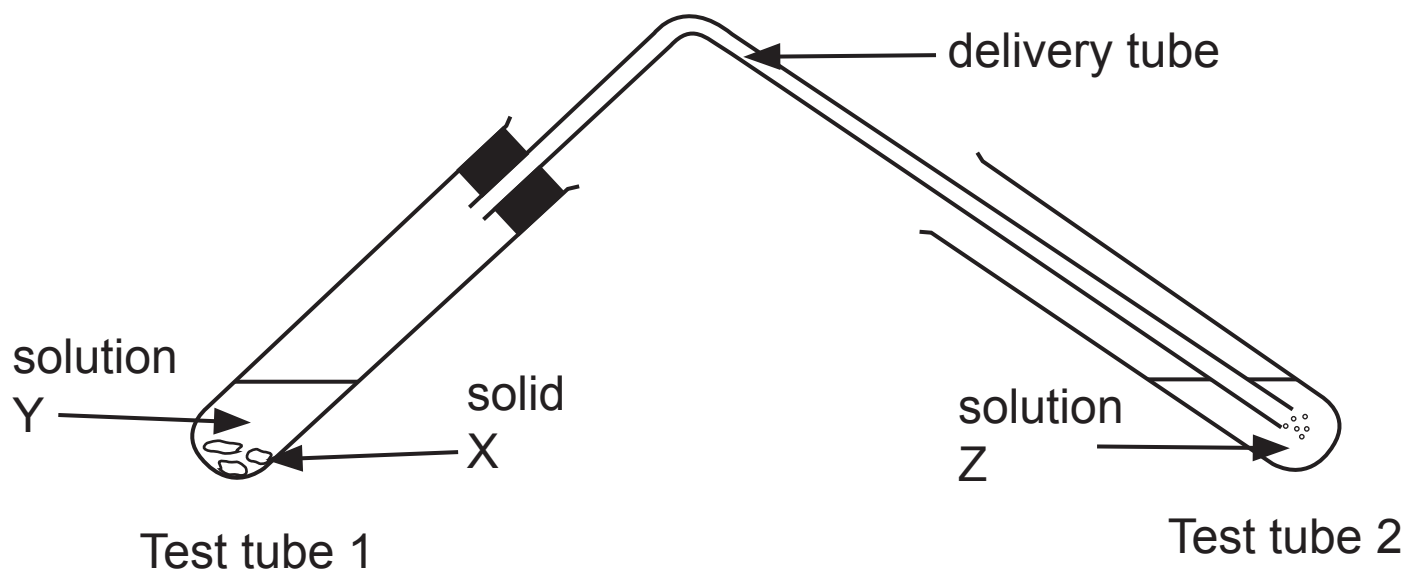
sulfuric acid

Hold a glass rod which has been dipped in concentrated _____ close to the gas. If ammonia is present a _____
_____ is observed.

(ii) Ammonia solution is an alkali. Describe how you would test the solution to prove it is an alkali.
[2 marks]

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(Questions continue overleaf)

(c) The following apparatus may be used to produce carbon dioxide in test tube 1 and test for carbon dioxide in test tube 2.



(i) Solid X and solution Y can be used to produce carbon dioxide in test tube 1. Circle the correct name of solid X and of solution Y. [2 marks]

Solid X is:

calcium

calcium carbonate

calcium oxide

Solution Y is:

hydrochloric acid

sodium hydroxide

sodium chloride

(ii) Name solution Z which is used to test for carbon dioxide. [1 mark]

(iii) State what is observed when carbon dioxide is bubbled through solution Z. [2 marks]

(iv) Write the formula for carbon dioxide. [1 mark]

This is the end of the question paper

Sources

Q5(a)...© CCEA
Q5(c)...© CCEA

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
Total Marks	

Examiner Number

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SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Butanoate	$\text{C}_3\text{H}_7\text{COO}^-$
Carbonate	CO_3^{2-}
Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogencarbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	HCOO^-
Nitrate	NO_3^-
Propanoate	$\text{C}_2\text{H}_5\text{COO}^-$
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}



New
Specification

Data Leaflet

Including the Periodic Table of the Elements

For the use of candidates taking
Science: Chemistry,
Science: Double Award
or Science: Single Award

Copies must be free from notes or additions of any kind. No other type of data booklet or information sheet is authorised for use in the examinations

SOLUBILITY IN COLD WATER OF COMMON SALTS, HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble
Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

gcse examinations chemistry

THE PERIODIC TABLE OF ELEMENTS

Group

												1 H Hydrogen 1						4 He Helium 2
1	2											3	4	5	6	7	0	
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	98 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54	
133 Cs Caesium 55	137 Ba Barium 56	139 La [*] Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86	
223 Fr Francium 87	226 Ra Radium 88	227 Ac [†] Actinium 89	261 Rf Rutherfordium 104	262 Db Dubnium 105	266 Sg Seaborgium 106	264 Bh Bohrium 107	277 Hs Hassium 108	268 Mt Meitnerium 109	271 Ds Darmstadtium 110	272 Rg Roentgenium 111	285 Cn Copernicium 112							

* 58 – 71 Lanthanum series
 † 90 – 103 Actinium series



a = relative atomic mass (approx)
x = atomic symbol
b = atomic number

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	242 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	245 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	253 Fm Fermium 100	256 Md Mendelevium 101	254 No Nobelium 102	257 Lr Lawrencium 103