



Rewarding Learning

General Certificate of Secondary Education
2017

Centre Number

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Candidate Number

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GCSE Chemistry

Unit 1

Foundation Tier



[GCH11]

GCH11

WEDNESDAY 14 JUNE, MORNING

TIME

1 hour 15 minutes.

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 outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all five** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **5(b)**.

A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

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20GCH1101

1 (a) The table below gives the melting points and boiling points of several elements.

Element	Melting point (°C)	Boiling point (°C)	Physical state at room temperature
magnesium	650	1090	solid
mercury	-39	357	
phosphorus	44	277	
xenon	-112	-108	

(i) Complete the table. [3]

(ii) Write the symbol for an element which is a liquid at room temperature. Do not use any of the elements in the table above.

_____ [1]

(b) When iodine is heated it changes from a solid to a gas.

(i) What name is given to this change of state?

_____ [1]

(ii) State the colour change observed when iodine is heated.

From _____ to _____ [2]



(c) Group 1 of the Periodic Table is a group of reactive metals.

(i) By what name are the Group 1 metals known?

_____ [1]

(ii) A piece of sodium metal is cut with a knife. Describe the appearance of the metal when it is freshly cut and a few minutes after it is cut.

_____ [2]

(iii) Write the symbol for the least reactive element in Group 1.

_____ [1]

(d) An atom of an element has the electronic configuration 2,8,5.

(i) In which group of the Periodic Table is this element found?

_____ [1]

(ii) In which period of the Periodic Table is this element found?

_____ [1]

(e) Group 0 of the Periodic Table is a group of unreactive non-metals.

(i) By what name are the elements of Group 0 known?

_____ [1]

(ii) Explain why the elements of Group 0 are unreactive.

_____ [2]

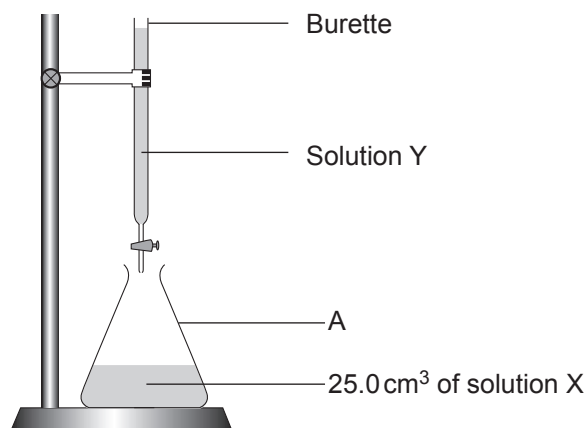
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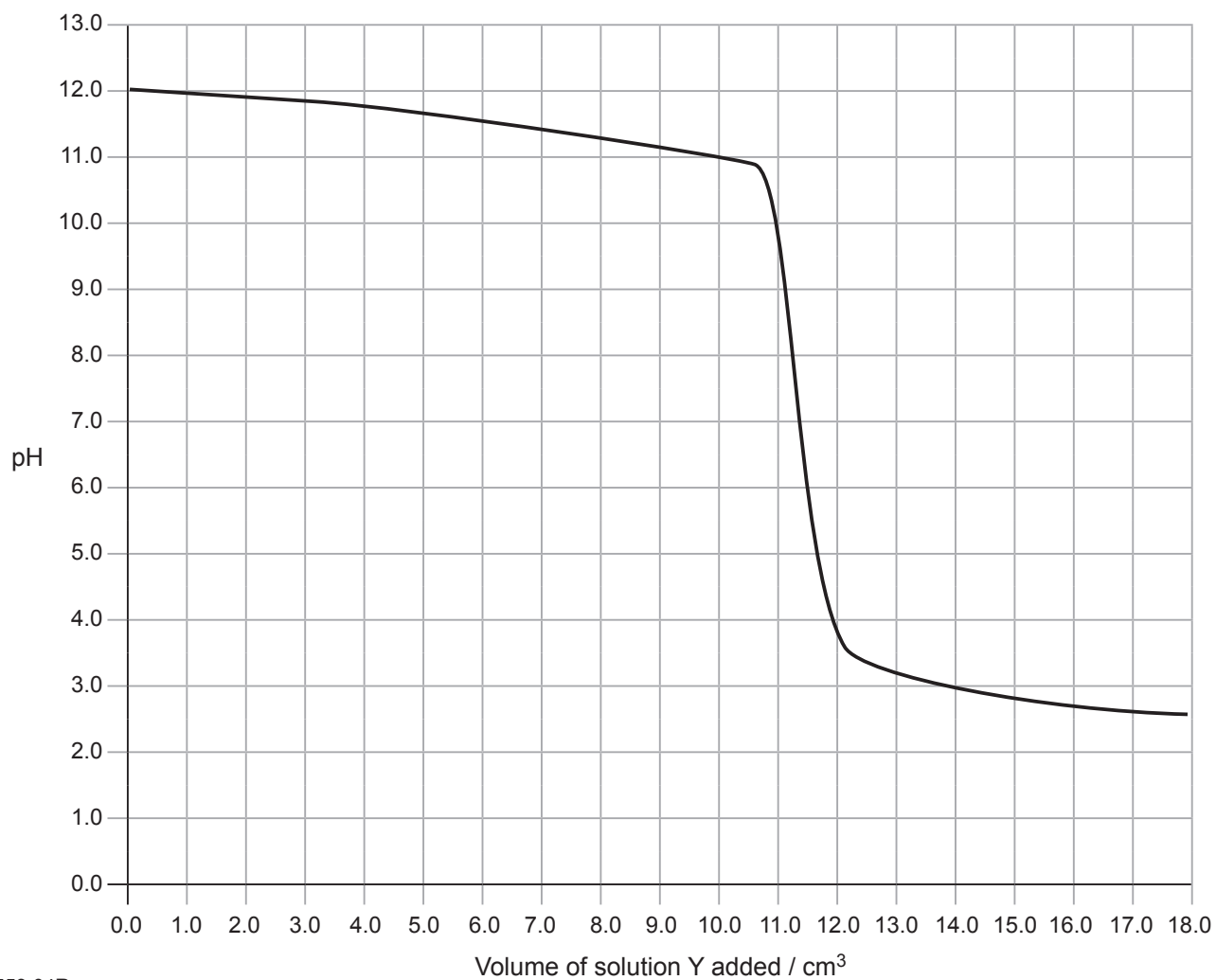


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- 2 (a) In an experiment a student slowly added solution Y in 0.5 cm^3 portions to 25.0 cm^3 of a solution X and swirled the solution. The apparatus for the experiment is shown below.



The pH after each addition of solution Y was measured and recorded. A graph of pH against volume of solution Y added was drawn.



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(i) Name the piece of apparatus labelled A.

_____ [1]

(ii) Suggest how the pH of the solution was measured.

_____ [1]

(iii) Why was the flask swirled after each addition of 0.5 cm^3 of solution Y?

_____ [1]

(iv) Use the graph to explain if solution X is an acidic, alkaline or neutral solution.

_____ [2]

(v) What is the pH when 14.0 cm^3 of solution Y have been added?

_____ [1]

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(b) Solution Z contains a mixture of two compounds. The mixture was tested to identify the cations and anions present in the mixture.

(i) Complete the table to give the expected observations.

Test	Observation	Deduction
1. flame test		sodium ions present
2. (i) add 1 cm ³ of sodium hydroxide solution (ii) add excess sodium hydroxide solution		zinc ions present
3. add some barium chloride solution		sulfate ions present
4. add some silver nitrate solution		chloride ions present

[5]



(ii) Write the formula for silver nitrate.

_____ [1]

(iii) Suggest the names of two different compounds which could be present in solution Z.

_____ [2]

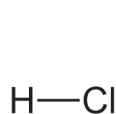
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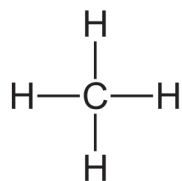


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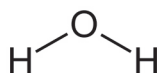
- 3 (a) Some covalent substances are shown below. They are labelled A, B, C, D, E and F.



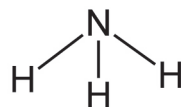
A



B



C



D



E



F

- (i) Which letter (A, B, C, D, E or F) represents methane? _____ [1]
- (ii) Which letter (A, B, C, D, E or F) represents ammonia? _____ [1]
- (iii) Which letter (A, B, C, D, E or F) represents a diatomic element? _____ [1]
- (iv) Write the chemical formula of D. _____ [1]
- (v) Draw a dot and cross diagram to show the bonding in A. Only outer shell electrons should be shown.

[1]



(vi) What is a covalent bond?

[2]

(vii) Substance A can be formed from the reaction between hydrogen and chlorine. Write a balanced symbol equation for the reaction.

[3]

(viii) Substance D reacts with substance A to form ammonium chloride. Write the formula for ammonium chloride.

[1]



(b) When atoms form ions they lose or gain electrons.

The table below shows some information about four different ions. Complete the table.

Ion	Atomic number	Mass number	Number of protons	Number of electrons	Number of neutrons
Mg^{2+}	12	24	12	10	12
O^{2-}	8				8
	19	39		18	
			30	28	35

[6]

(c) Mg^{2+} and O^{2-} ions are attracted to each other and form a compound.

(i) Name the compound.

_____ [1]

(ii) State the type of bonding and structure present in this compound.

Bonding: _____

Structure: _____ [2]

(iii) State two physical properties you would expect this compound to have.

1. _____

2. _____ [2]



4 Salts are ionic compounds which form during reactions of acids.

(a) Complete the table below.

Acid	Base	Name of salt formed	Formula of salt
nitric acid	potassium hydroxide		
	sodium hydroxide	sodium chloride	
sulfuric acid	copper(II) oxide		

[6]

(b) Write a balanced symbol equation for the preparation of the salt potassium chloride from potassium hydroxide and hydrochloric acid.

[2]

(c) Describe how you would produce pure dry crystals of potassium chloride from a solution of potassium chloride.

[3]

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- (d) To determine the solubility of copper(II) sulfate in water at 20°C a saturated solution of copper(II) sulfate was evaporated to dryness.

The following results were obtained:

mass of evaporating basin = 21.45 g

mass of evaporating basin and saturated solution = 47.85 g

mass of evaporating basin and copper(II) sulfate after heating = 27.85 g

- (i) Calculate the mass of copper(II) sulfate obtained after heating.

_____ g [1]

- (ii) Calculate the mass of water in the saturated solution.

_____ g [1]



(iii) Using your answers to (d)(i) and (ii) calculate the solubility of copper(II) sulfate at 20°C in g/100g water.

solubility _____ g/100g water [1]

(iv) State the trend in solubility of copper(II) sulfate as temperature increases.

_____ [1]



5 Calcium compounds have many uses, some of which are shown below.



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(a) The following table shows details of two different calcium compounds. Complete the table.

(Relative atomic masses: H = 1; C = 12; O = 16; Ca = 40)

Substance	Mass	Relative formula mass	Moles
CaCO_3	g		0.200
Ca(OH)_2	0.185g		

[4]



(c) Calculate the percentage of water of crystallisation, by mass, in hydrated calcium chloride, $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$.

(Relative atomic masses: H = 1; O = 16; Cl = 35.5; Ca = 40)

Percentage = _____ % [3]

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Question Number	Marks
1	
2	
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4	
5	

Total Marks	
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Examiner Number

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