



Rewarding Learning

General Certificate of Secondary Education  
2017–2018

Centre Number

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Candidate Number

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# Double Award Science: Chemistry

Unit C1  
Foundation Tier

[GSD21]

THURSDAY 8 NOVEMBER 2018, MORNING



## TIME

1 hour.

## INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.  
Write your answers in the spaces provided in this question paper.  
Answer **all ten** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 70.  
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 **10**.  
A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

| For Examiner's use only |       |
|-------------------------|-------|
| Question Number         | Marks |
| 1                       |       |
| 2                       |       |
| 3                       |       |
| 4                       |       |
| 5                       |       |
| 6                       |       |
| 7                       |       |
| 8                       |       |
| 9                       |       |
| 10                      |       |
| <b>Total Marks</b>      |       |

- 1 (a) A list of statements about the Periodic Table is given below.  
Draw straight lines to the matching word or words.

| Statement  | Matching word/words |
|--|---------------------|
| There are more of these elements than any other            | Period              |
| These elements have all got full outer shells of electrons | Metals              |
| A horizontal row of elements                               | Alkali metals       |
| The salts of these elements are white                      | Noble gases         |
| Chlorine, bromine and iodine form part of one of these     | Group               |
|  | Gases               |

[5]

- (b) The Periodic Table in your Data Leaflet has over 100 elements.  
Why were there only about 60 elements in Mendeleev's Periodic Table of 1869?

\_\_\_\_\_

\_\_\_\_\_ [1]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |

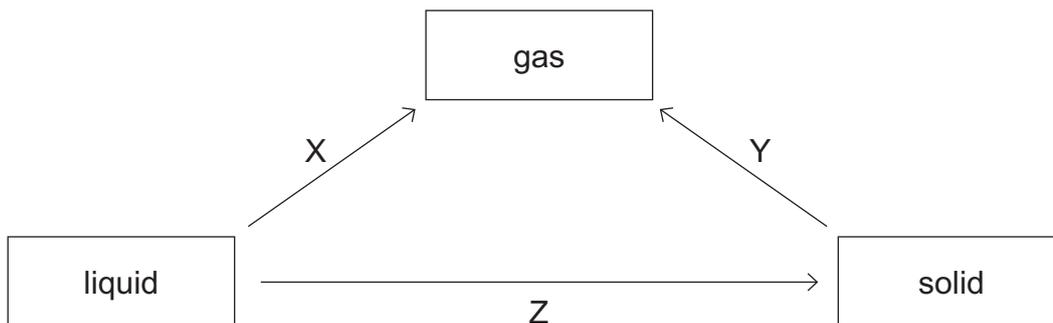
2 Matter exists in three states, solid, liquid and gas.

- (a) The table below gives some properties of solids, liquids and gases. Write **true** or **false** in the spaces provided. Some have been done for you.

| Property                                    | solid | liquid | gas   |
|---|-------|--------|-------|
| Has a fixed shape                           | true  | false  | false |
| Can be compressed                           | false | false  |       |
| Will condense when cooled                   | false |        | true  |
| Takes the volume and shape of the container |       | false  | true  |

[3]

- (b) The diagram below shows three changes of state labelled X, Y and Z.



- (i) Which letter X, Y or Z represents freezing?

\_\_\_\_\_ [1]

- (ii) What name is given to change of state Y?

\_\_\_\_\_ [1]

- (iii) Name a substance which can change directly from a solid to a gas.

\_\_\_\_\_ [1]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |

- 3 Sodium iodide is a white solid that dissolves in water to form a colourless solution A.  
Lead nitrate is a white solid that dissolves in water to form a colourless solution B.

When solutions A and B are mixed together a bright yellow solid and a colourless solution C are formed.

The yellow solid is lead iodide and it can be separated from the solution.

(a) Select chemical names, from the passage, to identify:

(i) a solute: \_\_\_\_\_ [1]

(ii) a solvent: \_\_\_\_\_ [1]

(iii) an insoluble substance: \_\_\_\_\_ [1]

(iv) a compound made of a metal and **one** non metal: \_\_\_\_\_ [1]

(v) the **two** negative ions in the compounds mentioned.

\_\_\_\_\_ and \_\_\_\_\_ [1]

(b) Draw a labelled diagram to show how the bright yellow solid can be separated from the solution C.

[4]

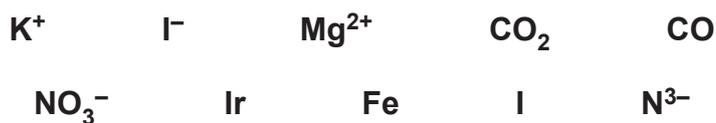
(c) Suggest the name of the colourless solution C.

\_\_\_\_\_ [1]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |



5 (a) Some chemical symbols and formulae are shown in the list below:



Choose a correct symbol or formula from the list to identify each of the following:

(i) iron \_\_\_\_\_ [1]

(ii) a cation \_\_\_\_\_ [1]

(iii) the iodide ion \_\_\_\_\_ [1]

(iv) a diatomic molecule \_\_\_\_\_ [1]

(v) a molecular ion \_\_\_\_\_ [1]

(b) Cryolite, which is used in the extraction of aluminium, has the formula  $Na_3AlF_6$ .

(i) How many different **elements** are there in cryolite?  
 \_\_\_\_\_ [1]

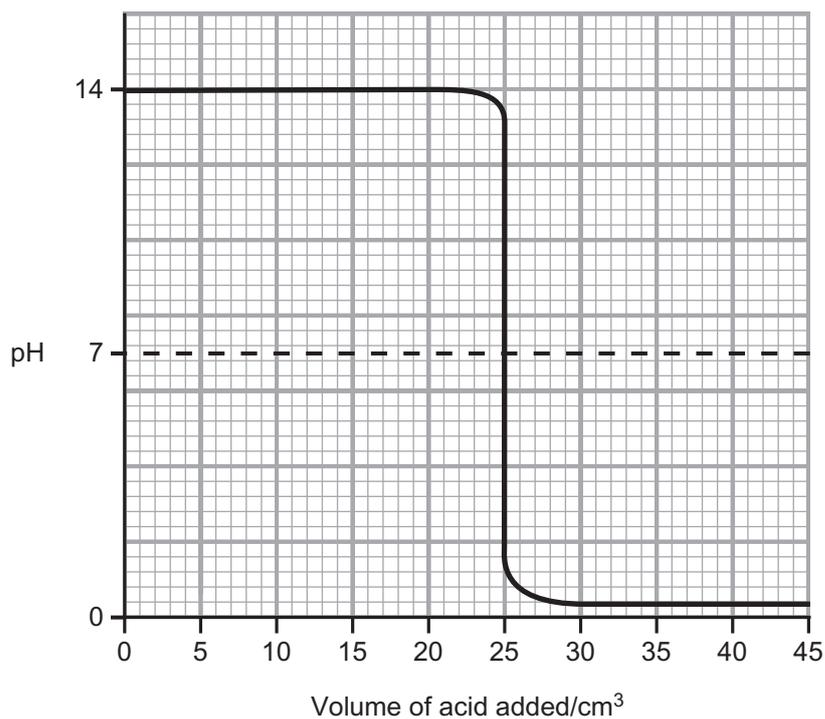
(ii) What is the total number of **atoms** shown in the formula of cryolite?  
 \_\_\_\_\_ [1]

(iii) **Name** the non-metal element in cryolite.  
 \_\_\_\_\_ [1]

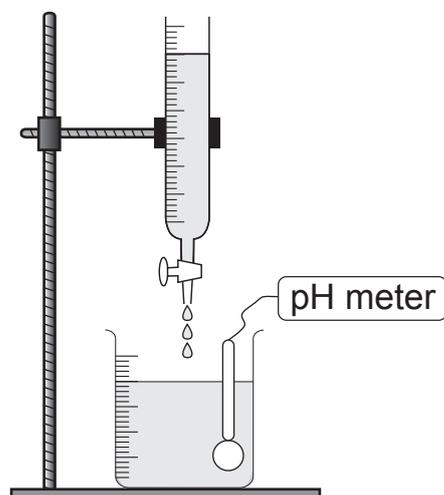
| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |
|               |        |



7 The graph below shows how the pH changed during a chemical reaction.



25 cm<sup>3</sup> of sodium hydroxide solution was measured out into a beaker. Dilute sulfuric acid was then added slowly and the pH was measured using a pH meter.



(a) What was the pH value of the solution in the beaker at the start of this experiment?

\_\_\_\_\_ [1]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |

(b) What volume of sulfuric acid was needed to cause the pH to fall sharply?

\_\_\_\_\_ [1]

(c) What negative ion is produced when sodium hydroxide dissolves in water?

\_\_\_\_\_ [1]

(d) What positive ion is produced when sulfuric acid dissolves in water?

\_\_\_\_\_ [1]

(e) What name is given to a reaction of an alkali and an acid to produce a salt and water?

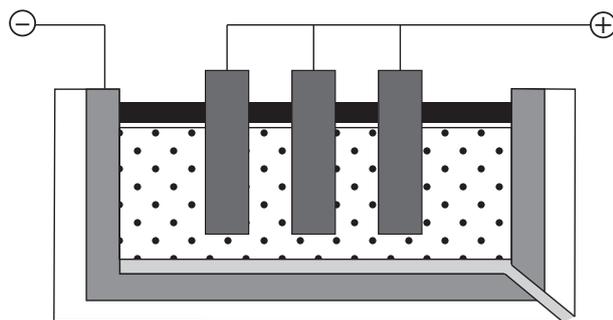
\_\_\_\_\_ [1]

(f) Write a balanced symbol equation for the reaction between sulfuric acid and sodium hydroxide.

\_\_\_\_\_ [3]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
|               |        |

- 8 The diagram below shows the industrial process used to extract aluminium from its ore by electrolysis.



production of aluminium  
from aluminium oxide

- (a) Explain the meaning of the term electrolysis.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

- (b) Name the aluminium ore which is purified to make aluminium oxide.

\_\_\_\_\_ [1]

- (c) Why do the anodes need to be replaced regularly during this extraction process?

\_\_\_\_\_

\_\_\_\_\_ [2]

- (d) Give two reasons why it is better for the environment to recycle aluminium rather than to extract even more of it.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |

- 9 Information about six metals A, B, C, D, E and F is given in the table below.

| Metal | Melting point/°C | Electrical conductivity | Relative cost | Relative density | Relative strength |
|-------|------------------|-------------------------|---------------|------------------|-------------------|
| A     | 660              | very good               | 29            | 1.0              | 10                |
| B     | 1083             | excellent               | 94            | 3.3              | 13                |
| C     | 1535             | good                    | 1             | 2.3              | 30                |
| D     | 962              | excellent               | 7300          | 2.9              | 7                 |
| E     | 420              | good                    | 46            | 2.6              | 15                |
| F     | 327              | fair                    | 34            | 4.2              | 1                 |

Use the information in the table and your own knowledge to answer the following questions.

- (a) Metal A is used in the construction of aircraft. Which **two** pieces of information, from the table, are the most important for this use?

\_\_\_\_\_ [1]

- (b) Give **two** reasons why metal C is a better choice for use in the construction of buildings than metal E.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

- (c) Which metal, apart from A, would be most suitable for electrical cables in homes? Give **two** reasons for your choice.

Metal: \_\_\_\_\_ [1]

Reasons: \_\_\_\_\_  
 \_\_\_\_\_ [2]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
| ○             | ○      |









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## SYMBOLS OF SELECTED IONS

### Positive ions

| Name          | Symbol           |
|---------------|------------------|
| Ammonium      | $\text{NH}_4^+$  |
| Chromium(III) | $\text{Cr}^{3+}$ |
| Copper(II)    | $\text{Cu}^{2+}$ |
| Iron(II)      | $\text{Fe}^{2+}$ |
| Iron(III)     | $\text{Fe}^{3+}$ |
| Lead(II)      | $\text{Pb}^{2+}$ |
| Silver        | $\text{Ag}^+$    |
| Zinc          | $\text{Zn}^{2+}$ |

### Negative ions

| Name               | Symbol                       |
|--------------------|------------------------------|
| Carbonate          | $\text{CO}_3^{2-}$           |
| Dichromate         | $\text{Cr}_2\text{O}_7^{2-}$ |
| Ethanoate          | $\text{CH}_3\text{COO}^-$    |
| Hydrogen carbonate | $\text{HCO}_3^-$             |
| Hydroxide          | $\text{OH}^-$                |
| Methanoate         | $\text{HCOO}^-$              |
| Nitrate            | $\text{NO}_3^-$              |
| Sulfate            | $\text{SO}_4^{2-}$           |
| Sulfite            | $\text{SO}_3^{2-}$           |

## DATA LEAFLET

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

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

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# gcse . Science

## chemistry double award single award

