

New  
Specification



*Rewarding Learning*

General Certificate of Secondary Education  
2012–2013

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**Science: Single Award**

Unit 2 (Chemistry)

Higher Tier

[GSS22]

**TUESDAY 28 FEBRUARY 2012**

**11.00 am–12.15 pm**

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**MARK  
SCHEME**

|   |   | AVAILABLE MARKS |
|---|---|-----------------|
| 1 | (a) (i) 3   | [1]             |
|   | (ii) lithium  | [1]             |
|   | (b) (i) $37.5 \pm 0.5$  | [1]             |
|   | (ii) rubidium   | [1]             |
|   | (c) one/alkali metals   | [1]             |
|   | (d) as the atomic number increases, the melting point decreases           | [1]             |
|   | reference to change in slope as atomic number increases                   | [1]             |
|   | (e) (i) fluorine  | [1]             |
|   | (ii) bromine  | [1]             |
|   | (iii) increase, increase<br>or<br>decrease, decrease                      | [1]             |
| 2 | (a) (i) $18 + 113 [1] = 131 [1]$  | [2]             |
|   | (ii) hydrogencarbonate  | [1]             |
|   | (b) calcium hydrogencarbonate $\longrightarrow$ carbon + water<br>dioxide | [3]             |
|   | (c) does not lather [1] forms scum or/with soap [1]                       | [2]             |
|   | (d) <b>Indicative content</b>   |                 |
|   | ● Take a given volume of bottled water                                    |                 |
|   | ● Add soap solution to get a permanent lather                             |                 |
|   | ● Record volume of soap solution  |                 |
|   | ● Repeat procedure for tap water  |                 |
|   | ● Water which requires most soap is hardest                               |                 |
|   | ● A correctly named piece of apparatus                                    |                 |
|   | ● A controlled variable   |                 |
|   |   | 10              |

| Band | Response  | Mark |
|------|---|------|
| A    | Using 5–7 of the points shown in the indicative content, candidates describe fully an experiment to test the hardness of two water samples and compare them, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a good high standard.           | 5–6  |
| B    | Using 3–4 of the points shown in the indicative content candidates describe fully an experiment to test the hardness of two water samples and compare them, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | 3–4  |
| C    | Candidates make reference to 1–2 of the points shown in the indicative content using limited spelling, punctuation and grammar. The form and style is of limited standard and they have made little use of the specialist terms.  | 1–2  |
| D    | Response not worthy of credit.  | 0    |

AVAILABLE  
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|     |  |     |    |
|-----|--|-----|----|
|     |  | [6] |    |
| (e) | better taste/stronger teeth and bones/reduce risk of heart disease | [1] | 15 |
| 3   | (a) (i) 3  | [1] |    |
|     | (ii) 12  | [1] |    |
|     | (iii) $2 + 3 + 12 = 17$  | [1] |    |
|     | Alternative answer:<br>Accept graphite.                            |     |    |
| (b) | negatively, carbon, cathode, aluminium<br>anode, oxygen            | [6] | 9  |

|   |         |  | AVAILABLE MARKS                      |    |
|---|---------|--|--------------------------------------|----|
| 4 | (a) (i) | low density, reasonable cost still a good conductor [1]                          | any 2 properties + 1 explanation [3] | 12 |
|   | (ii)    | strong metal, low cost   | [2]                                  |    |
|   | (b) (i) | B  |                                      |    |
|   | (ii)    | C  |                                      |    |
|   | (iii)   | A  | [3]                                  |    |
|   | (c)     | the particles are reduced in size [1] to nano size [1]                           | [2]                                  |    |
|   | (d)     | material which can change properties with surroundings [1] light/temperature [1] | [2]                                  |    |

5 (a) 2, 8, 1 arrangement [1] 2, 8, 7 arrangement [1] [2]

(b) **Indicative content**

- Transfer
- Correct direction of transfer
- Correct number of electrons transferred
- Correct charge on the sodium ion
- Correct charge on the chloride ion
- Correct idea of full outer shells

| Band | Response  | Mark |
|------|---|------|
| A    | Using 5–6 of the points shown in the indicative content, candidates describe fully how the atoms of sodium and chlorine join to form sodium chloride in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.                | 5–6  |
| B    | Using 3–4 of the points shown in the indicative content candidates describe fully how the atoms of sodium and chlorine join to form sodium chloride in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | 3–4  |
| C    | Candidates make reference to 1–2 of the points shown in the indicative content using limited spelling, punctuation and grammar. The form and style is of limited standard and they have made little use of the specialist terms.  | 1–2  |
| D    | Response not worthy of credit.  | 0    |

[6]

AVAILABLE  
MARKS

8

|              |   |     | AVAILABLE MARKS |
|--------------|---|-----|-----------------|
| 6            | (a) He counted the generations [1]<br>He added them up to get to the present time [1]   | [2] | 8               |
|              | (b) 6000 years  | [1] |                 |
|              | (c) remains of an animal or plant [1]<br>preserved in rock [1]  | [2] |                 |
|              | (d) radioactivity/use of radio isotopes/uranium or potassium/<br>presence of daughter nuclei/in rocks <i>any 3</i>  | [3] |                 |
| 7            | (a) earth, fire, wind/air, water  | [1] | 6               |
|              | (b) law of octaves/every 8th element/was similar  | [1] |                 |
|              | (c) (i) atomic mass order   | [1] |                 |
|              | (ii) for undiscovered elements  | [1] |                 |
|              | (d) Idea of increasing atomic number/Proton number order [1]<br>Idea of groups – Noble gases or transition metals [1]<br>number of electrons in outer shell equal to group number [1] | [2] |                 |
| 8            | (a) (i) ethene  | [1] | 7               |
|              | (ii) correct structure for propane  | [1] |                 |
|              | (iii) C <sub>4</sub> H <sub>10</sub> [1] C <sub>2</sub> H <sub>4</sub> [1]  | [2] |                 |
|              | (b) $\left[ \begin{array}{cc} \text{H} & \text{Cl} \\   &   \\ \text{--- C} & \text{--- C ---} \\   &   \\ \text{H} & \text{H} \end{array} \right]_n$                                 |     |                 |
|              | single bond [1]<br>brackets with correct ratio of atoms [1]<br>correct position of "n" [1]  | [3] |                 |
| <b>Total</b> |   |     | <b>75</b>       |