



*Rewarding Learning*

**General Certificate of Secondary Education  
2011**

---

**Science: Chemistry**

**Paper 2  
Foundation Tier**

**[G1402]**

**TUESDAY 7 JUNE, AFTERNOON**

---

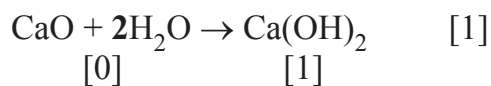
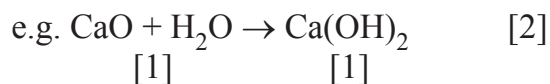
**MARK  
SCHEME**

## Guidelines for marking equations

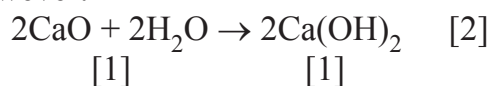
### Equations where the stoichiometry is 1 gain [2] maximum

[1] for correct formula of reactant/s

[1] for correct formula of product/s



However:

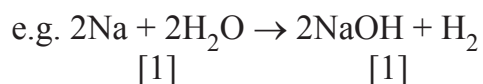


### Equations where the stoichiometry is more than 1 gain [3]

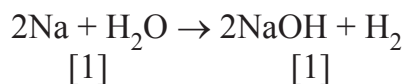
[1] for correct formula of reactant/s

[1] for correct formula of product/s

[1] for correct balancing



+ [1] for balancing = [3]



No balancing mark = [2]

1 (a) (i) two atoms. [1]

(ii) hydrogen/oxygen/any halogen. [1]

(iii) oxygen/any noble gas. [1]

(iv)

|   |                        |
|---|------------------------|
| <b>Name</b>                                   | nitrogen               |
| <b>State at room temperature and pressure</b> | gas [1]                |
| <b>Colour</b>                                 | colourless [1]         |
| <b>Odour</b>                                  | odourless/no odour [1] |

[3]

(v) unreactive/inert [1]

(b)

|   |                    |
|---|--------------------|
| <b>Name</b>                                   | Ammonia            |
| <b>State at room temperature and pressure</b> | gas [1]            |
| <b>Colour</b>                                 | colourless [1]     |
| <b>Odour</b>                                  | pungent/smelly [1] |
| <b>pH of aqueous ammonia</b>                  | 9–11 [1]           |

[4]

(c) (i) white [1] smoke/fumes/solid/cloud [1] [2]

(ii) corrosive [1]

(iii) gloves/lab coat/fume cupboard/apron [1]

(d) nitrogen = method 1 [1]  
ammonia = method 3 [1]  
hydrogen chloride = method 2 [1] [3]

AVAILABLE  
MARKS

18

- 2 (a) (i) solid dissolved/solute [1]  
in a liquid/solvent [1] [2]
- (ii) a few well spaced particles [1]
- (iii) decreases [1]
- (iv) increases [1]
- (b) (i) flammable [1]
- (ii) explosion risk [1]

(c) (i)

| Element | Melting point (°C) | Boiling point (°C) | State at room temperature (20°C) |
|---------|--------------------|--------------------|----------------------------------|
| silicon | 1410               | 2355               | solid [1]                        |
| oxygen  | -219               | -183               | gas [1]                          |
| sodium  | 98                 | 890                | solid [1]                        |
| bromine | -7                 | 59                 | liquid [1]                       |

[4]

- (ii) substance which cannot be broken down into anything simpler [1]  
by chemical means [1]  
(substance made up of only one type of atom [2]) [2]

AVAILABLE  
MARKS

(d) (i) B [1]

(ii) 660 [1] °C [1]

(iii) liquid [1] to gas [1]  
solid [1] to gas [1]  
gas [1] to liquid [1] [6]

3 (a) (i) A = anode [1]  
B = cathode [1]  
C = evaporating basin/crucible [1]  
D = gauze/pipeclay triangle [1]  
E = tripod [1] [5]

(ii) bulb/ammeter [1]

(iii) decomposition [1]  
using (a direct current of) electricity [1] [2]

(iv) ions [1]

(v)

| Electrode | Observations                                    | Name of Product |
|-----------|---|-----------------|
| A         | red-brown [1]<br>pungent [1]<br>gas [1] max [2] | bromine [1]     |
| B         | silvery grey bead                               | lead [1]        |

[4]

(vi) bromine/lead fumes are toxic [1]

AVAILABLE  
MARKS

21

|      |   |  | AVAILABLE MARKS  |     |
|------|---|--|--|-----|
| (b)  | (i)   | F impure copper [1]<br>G pure copper [1]   | [2]  | 18  |
|      | (ii)  | copper sulphate/copper chloride/copper nitrate   | [1]  |     |
|      | (iii)   | ductile  | [1]  |     |
| 4    | (a)   | (i) add universal indicator/pH paper [1] compare to colour chart [1]<br>or use pH meter [1] read off value [1] | [2]  |     |
|      |   |  | (ii) weak acid lemon juice [1]<br>strong alkali sodium hydroxide [1]<br>neutral water [1]  |     |
|      | (iii)   | H <sup>+</sup>   | [1]  |     |
|      | (iv)  | hydroxide  | [1]  |     |
|      | (v)   | sodium sulphate  | [1]  |     |
|      | (vi)  | $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$                | [3]  |     |
|      | (b)   | (i)  | lead nitrate [1]   |     |
|      |   |  | any soluble iodide, e.g. sodium iodide, potassium iodide etc. [1]  |     |
|      |   | (ii)   | marks are awarded for labelled and <i>recognisable</i> pieces of <i>assembled</i> apparatus<br>labels: filter funnel [1]<br>filter paper [1]<br>conical flask/suitable container [1] | [3] |
|      |   | (iii)  | low temperature oven/desiccator  | [1] |
| (iv) |   | lead(II) ion Pb <sup>2+</sup> [1]<br>iodide ion I <sup>-</sup> [1]   | [2]  |     |
| (v)  | PbCl <sub>2</sub> /PbSO <sub>4</sub> /PbO/PbBr <sub>2</sub> | [1]  | 20   |     |

5 (a) (i)

|                  |                |                     |         |                   |
|------------------|----------------|---------------------|---------|-------------------|
| <b>Reactants</b> | <b>Name</b>    | <b>Nitrogen [1]</b> | Sulphur | <b>Carbon [1]</b> |
|                  | <b>Formula</b> | N <sub>2</sub>      | S       | C                 |

**Combustion**

|                 |                |                     |                            |                     |
|-----------------|----------------|---------------------|----------------------------|---------------------|
| <b>Products</b> | <b>Name</b>    | Nitrogen dioxide    | <b>Sulphur dioxide [1]</b> | Carbon dioxide      |
|                 | <b>Formula</b> | NO <sub>2</sub> [1] | SO <sub>2</sub>            | CO <sub>2</sub> [1] |

[5]

(ii) fuels and oxygen [1]  
 reacting [1]  
 releasing heat [1]  
 forming oxides [1] max [3]

(iii) carbon [1]

(iv) water [1]

(v) dead plants/animals [1]  
 millions of years [1]  
 heat (and) pressure [1] [3]

**Quality of written communication** [2]

(b) (i) substance containing only [1] carbon and hydrogen [1] [2]

(ii)

| <b>Material</b> | <b>solid</b> | <b>liquid</b> | <b>gas</b> |
|-----------------|--------------|---------------|------------|
| Polystyrene     | ✓ [1]        |               |            |
| Petrol          |              | ✓ [1]         |            |
| Polythene       | ✓ [1]        |               |            |
| Methane         |              |               | ✓ [1]      |
| Candle wax      | ✓ [1]        |               |            |

[5]

AVAILABLE  
MARKS

|   |   | AVAILABLE MARKS |
|---|---|-----------------|
|   | (iii) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$             | [3]             |
|   | (iv) carbon monoxide  | [1]             |
| 6 | (a) gives out heat  | [1]             |
|   | (b) (i) A combustion  | [1]             |
|   | B neutralisation  | [1]             |
|   | (ii) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$                             | [3]             |
|   | (c) (i) $2\text{Mg} + \text{CO}_2 \rightarrow 2\text{MgO} + \text{C}$                       | [3]             |
|   | (ii) Mg continues to burn [1]<br>white light [1]<br>white [1] solid [1]<br>black specks [1] | max [3]         |
|   | (d) (i) magnesium gains oxygen [1]<br>gain of oxygen is oxidation [1]                       | [2]             |
|   | (ii) copper oxide loses oxygen [1]<br>loss of oxygen is reduction [1]                       | [2]             |
|   | (iii) black   | [1]             |
|   | <b>Total</b>  | <b>17</b>       |
|   |   | <b>120</b>      |