Rewarding Learning

General Certificate of Secondary Education
2013–2014

# Double Award Science: Chemistry

## Unit C1

## Foundation Tier

**[GSD21]**

**THURSDAY 15 MAY 2014, MORNING**

# MARK SCHEME

# General Marking Instructions

## Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

## The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

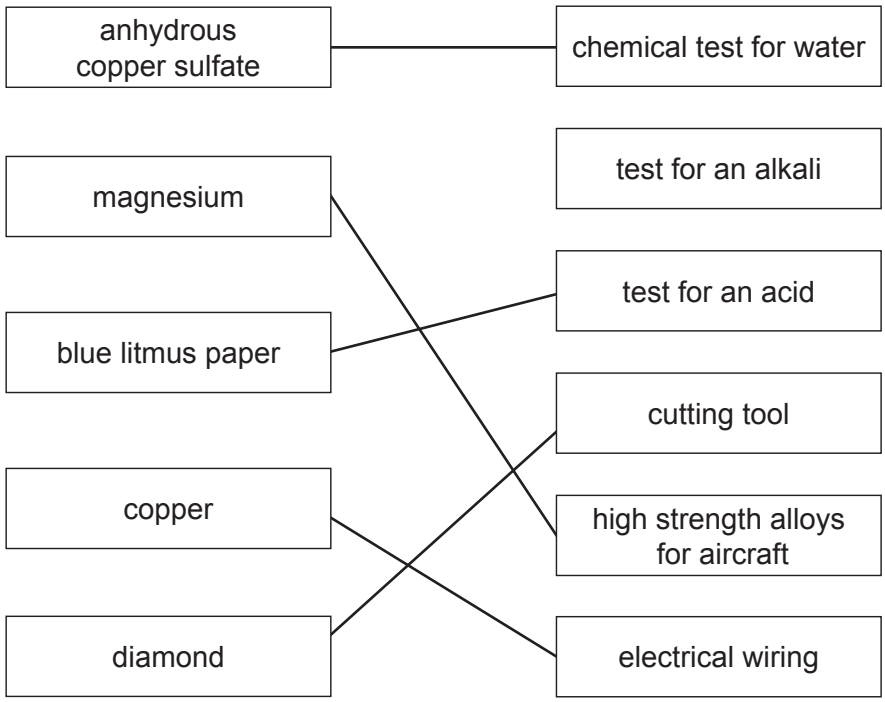
The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

AVAILABLE MARKS

**1**




5 × [1] [5] 5

**2** **(a)** sublimation [1]

**(b)**

| Property | Iodine | |
|---|---|---|
| | **solid** | **gas** |
| has a fixed shape | ✓ | |
| takes the shape of the bottom of the container | | |
| takes the volume and shape of the container | | ✓ [1] |
| can be compressed easily | | ✓ |
| cannot be compressed easily | ✓ [1] | |

[1] mark for each column [2]

**(c)** Halogens or Group 7 [1] 4

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| 3 | **(a)** | blue | [1] | |
| | **(b)** | contains water of crystallisation | [1] | |
| | **(c)** | • filter paper<br>• filter funnel<br>• suitable container, e.g. conical flask/beaker – as part of filtration apparatus<br>• liquid in flask/beaker<br>• solid in filter paper<br>5 apparatus/diagram points = [3]<br>3 or 4 apparatus/diagram points = [2]<br>2 apparatus/diagram points = [1]<br>3 or more labels = [1] | [4] | 6 |
| 4 | **(a)** | electrolysis | [1] | |
| | **(b)** | $2H_2O \rightarrow \mathbf{2}H_2 + O_2$ | [1] | |
| | **(c)** | apply a lighted splint [1]<br>It burns with a pop [1] | [2] | |
| | **(d)** | **(i)**  | [1] | |
| | | **(ii)** Any **two** from:<br>• can warn of danger<br>• eye-catching<br>• can be understood if you cannot read<br>• can be understood if you do not speak the language<br>• internationally agreed<br>2 × [1] | [2] | 7 |

AVAILABLE MARKS

**5** **Indicative content**

- protons
- electrons
- neutrons
- **5** protons
- **5** electrons
- **6** neutrons
- protons in nucleus
- neutrons in nucleus
- electrons in shells
- electronic configuration 2,3

| **Response** | **Mark** |
|---|---|
| Candidates make reference to **8–10** of the main points above to describe the structure of an atom of boron. They use good spelling, punctuation and grammar and the form and style are of a high standard. | [5–6] |
| Candidates make reference to **5–7** of the main points above to describe the structure of an atom of boron. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | [3–4] |
| Candidates make reference to **1–4** of the main points above using limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms. | [1–2] |
| Candidates make no reference to the main points/and offer no other suitable response. | [0] |

[6] 6

**6** **(a)** A [1]

**(b)** **(i)** D [1]

**(ii)** ions [1]

**(c)** A [1]

**(d)** C [1] 5

| | | AVAILABLE MARKS |
|---|---|---|
| 7 | **(a)** **2**K + $Cl_2$ → **2KCl**<br>[1] mark for formula of product<br>[1] mark for balancing [2] | |
| | **(b)** cut surface is shiny or similar, e.g. Accept silver/silvery [1] | |
| | **(c)** tarnishes (quickly)/goes dull<br>Accept idea of reacting unless wrongly qualified [1] | |
| | **(d)** Idea that it reacts with water vapour and/or oxygen/air<br>**Not** just 'it reacts' [1] | |
| | **(e)** any suitable safety precaution **particular to this reaction** except wearing safety goggles<br>• use small piece of metal<br>• use a safety screen<br>• handle with tongs **Not** 'do not handle with fingers' **Not** wear gloves **Not** tying hair back **Not** tucking in tie **Not** wear lab coat<br>• Allow idea of standing well back [2] | |
| | **(f)** **(i)** (as Group 1 is descended) the reactivity increases [1] | |
| | **(ii)** idea that at the beginning the universal indicator is green because it is in a neutral liquid [1] i.e. that liquid/water/solution is neutral<br>the **reaction** produces an alkaline solution [1]<br>clear and explicit that universal indicator is blue in alkaline solution [1] [3] | |
| | **(iii)** idea that a gas is produced/bubbles/fizzing/heat being given out or other correct [1] | |
| | **(iv)** sodium + water → sodium hydroxide [1] + hydrogen [1]<br>Allow [1] if both products correct but no reactants given [2] | 14 |

AVAILABLE MARKS

**8** **(a)** an element contains only one type of atom/an element cannot be broken down into anything simpler (by chemical means) [1]

**(b)** (relative) atomic mass
**Not** atomic mass number, **Not** mass [1]

**(c)**

| Name | Symbol | Metal/Non-metal |
|---|---|---|
| phosphorus | **P** | **non-metal** |
| **bismuth** | Bi | **metal** |

4 correct = [2] 2 or 3 correct = [1] [2]

**(d)** Period 2 [1]

**(e)** it has 7 electrons in the outer shell [1]
all group 5 elements have 5 electrons in the outer shell [1]
**or**
i.e. clear and explicit idea that group is determined by number of electrons in outer shell [1]
link between 7 electrons and group 7 **or** 5 electrons and group 5 [1]
second mark dependent on first [2] 7

**9** **(a)** hydrochloric acid [1]

**(b)** it is not soluble in water (alkalis are soluble in water) [1]

**(c)** produces a salt and water (only)
**or** idea that hydrogen ions and hydroxide ions form water [1]

**(d)** idea that MgO disappears [1] allow idea of heat given out [1]
colourless solution remains [1]
Max. [2] out of [3] [2]
**Not** idea of bubbles/fizzing.
If idea of gas produced is given Max. mark is [1]

**(e)** **(i)** idea of comparison on a colour chart [1]

**(ii)** pH of a weak acid is in the range 3–6/orange colour with universal indicator (indicates a weak acid)
Allow simple answers such as pH is 3 (3.03) [1]

**(iii)** ethanoic acid/vinegar or other correct named weak acid, e.g. citric acid [1]

**(iv)** concentration [1]

9

| | | | | | AVAILABLE MARKS |
|---|---|---|---|---|---|
| **10** | **(a)** | **(i)** | 12.1 × 4 = 48.4g/100 g $H_2O$ | [1] | |
| | | **(ii)** | 7–8 tabulated points correctly drawn = [2]<br>4–6 points correctly drawn = [1]<br>smooth curve/line [1] | [3] | |
| | **(b)** | **(i)** | for most solids the solubility **increases** as the temperature **increases**<br>Both needed | [1] | |
| | | **(ii)** | Up to 30 °C the solid becomes more soluble [1]<br>between 30 °C and 40 °C the solubility is constant [1]<br>idea that above 40 °C the solid becomes less soluble [1]<br>Any [2] out of three<br>i.e. Idea of solubility rising then decreasing [1]<br>Reference to temperature(s) needed for both marks | [2] | 7 |
| | | | | **Total** | **70** |