Rewarding Learning

General Certificate of Secondary Education
2013

# Science: Chemistry

## Unit C1

## Foundation Tier

**[GCH11]**

**MONDAY 10 JUNE, AFTERNOON**

# 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** | **(a)** | **(i)** | phosphorus/sulfur/iodine | [1] | |
| | | **(ii)** | hydrogen/nitrogen/oxygen/bromine/iodine | [1] | |
| | | **(iii)** | hydrogen/nitrogen/oxygen/helium/neon/argon | [1] | |
| | | **(iv)** | iron/copper | [1] | |
| | | **(v)** | rubidium | [1] | |
| | | **(vi)** | argon | [1] | |
| | | **(vii)** | iodine | [1] | |
| | **(b)** | **(i)** | yellow-green [1]<br>gas [1] | [2] | |
| | | **(ii)** | lithium chlor**ide** | [1] | |
| | | **(iii)** | (chlorine is) toxic | [1] | |
| | | **(iv)** | $2K + Cl_2 \rightarrow 2KCl$<br>[1] for correct formulae of reactants<br>[1] for correct formula of product<br>[1] for correct balancing | [3] | |
| | | **(v)** | halogens | [1] | 15 |

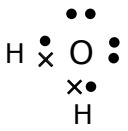
**2 (a) (i)**

AVAILABLE MARKS

| Atom | Atomic number | Mass number | Number of protons | Number of neutrons | Number of electrons |
|---|---|---|---|---|---|
| $^{1}_{1}H$ | 1 | 1 | 1 | 0 | 1 |
| $^{16}_{8}O$ | 8 | 16 | 8 | 8 | 8 |

[1] for each row [2]

**(ii)**




either shared pair of electrons labelled as A [1]
either lone pair of electrons labelled as B [1] [2]

**(iii)** 20 protons in nucleus [1]
20 neutrons in nucleus [1]
EC drawn 2,8,8 [1] [3]

AVAILABLE MARKS

**(b) (i)** **mixture** of two or more **elements** [1]
at least one of which is a metal [1] [2]

**(ii)** overhead electrical cables/aircraft alloys [1]

**(iii)** diamond [1]

**(iv)** **Indicative content**

**High melting point:**
- strong bond between (carbon) atoms/in the layers [1]
- idea that these bonds are covalent [1]
- a lot of energy/heat required to break bonds [1]

**Soft**:
- layers can slide (off/over each other) [1]
- as there are weak forces (of attraction between the layers) [1]

**Conduct electricity:**
- delocalised electrons/free electrons [1]
- can move and carry the charge [1]

| **Response** | **Mark** |
|---|---|
| Candidates must use appropriate specialist terms to explain fully the physical properties of graphite using a structural model (**using 6–7 points** of indicative content). They use good spelling, punctuation and grammar and the form and style are of a high standard. | [5]–[6] |
| Candidates use some appropriate specialist terms to explain the physical properties of graphite using a structural model (**using 3–5 points** of indicative content). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | [3]–[4] |
| Candidates explain briefly and partially the physical properties of graphite using a structural model (using **at least 2 points** of indicative content). They use limited spelling, punctuation and grammar and they have made little use of specialist terms. The form and style are of a limited standard. | [1]–[2] |
| Response not worthy of credit | [0] |

[6] 17

**3 (a)**

AVAILABLE MARKS

| Copper compound | Formula | Colour | Relative Formula Mass |
|---|---|---|---|
| Hydrated copper(II) chloride | $CuCl_2.2H_2O$ | blue | 171 [1] |
| Copper(II) oxide | CuO | black [1] | 80 [1] |
| Copper(II) nitrate | $Cu(NO_3)_2$ [1] | blue | 188 [1] |

[5]

**(b) (i)** RFM of $CuCO_3$ = 124 [1]

$\left(\frac{4.65}{124} = \right)$ 0.0375 [1] [2]

**(ii)** no more bubbles/gas given off [1]

**(iii)** RFM of $CuSO_4$ = 160 [1]

$(0.02 \times 160 =)$ 3.2 [1] g [2]

**(c)** RAM of X = 48 [1]

X is titanium/Ti [1] [2] 12

**4 (a) (i)**

AVAILABLE MARKS

| Solution | Colour in universal indicator | pH |
|---|---|---|
| Deionised water | Green | 7 [1] |
| Milk | Yellow [1] | 6 |
| Washing soda | Blue/Purple [1] | 12 |
| Sulfuric acid | Red | any value between 0 and 2 [1] |

[4]

**(ii)** weak acid: milk [1]
strong alkali: washing soda [1] [2]

**(b) (i)** 5/6 points correct [2]
3/4 points correct [1]
1/2 points correct [0]
curve/best fit line [1] [3]

**(ii)** idea of temperature increase [1]

**(iii)** neutralisation [1]

**(iv)** $NaOH + HCl \rightarrow NaCl + H_2O$
[1] for correct formulae of reactants
[1] for correct formulae of products [2]

13

| | | | AVAILABLE MARKS |
|---|---|---|---|
| **5** | **(a)** mass of solute [1] which will saturate [1] 100 g of water [1] at a particular temperature [1] in the context of a definition **or** maximum [1] mass of solute which dissolves in [1] 100 g of water [1] at a particular temperature [1] [4] | | |
| | **(b)** to remove the solid (which did not dissolve) [1] | | |
| | **(c)** marks are awarded for recognisable pieces of equipment correctly labelled and assembled to suit the experiment<br>filter funnel [1]<br>filter paper [1]<br>suitable container [1] to collect filtrate [3] | | |
| | **(d)** $(7.1 \times 4 =) 28.4$ (g/100 g water) [1] | | 9 |

**6** **(a)** **(i)** hydrogen [1] ion [1]

**(ii)**

| | **Hydrochloric acid** |
|---|---|
| Colour of red litmus paper | red [1] |
| Colour of blue litmus paper | red [1] |

[2]

**(iii)** pH meter [1]
lowest reading is the strongest [1] [2]

**(b)**

| | **Hydrochloric acid** | **Hydrobromic acid** | **Hydroiodic acid** |
|---|---|---|---|
| Observation on adding a few drops of silver nitrate solution. | white ppt | cream ppt | yellow ppt |

[1] for each correct colour
[1] for ppt in at all 3 tests [4]

**(c)** **(i)**

| **Metal ion** | **Flame colour** |
|---|---|
| Potassium | lilac [1] |
| Calcium | red [1] |
| Copper | blue-green [1] |

[3]

**(ii)** A copper/copper(II)/$Cu^{2+}$ [1]
B magnesium/$Mg^{2+}$ [1] [2]

**Total**

AVAILABLE MARKS

14

**80**