New Specification

Rewarding Learning

General Certificate of Secondary Education
2017–2018

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GDW21]

THURSDAY 17 MAY 2018, 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.

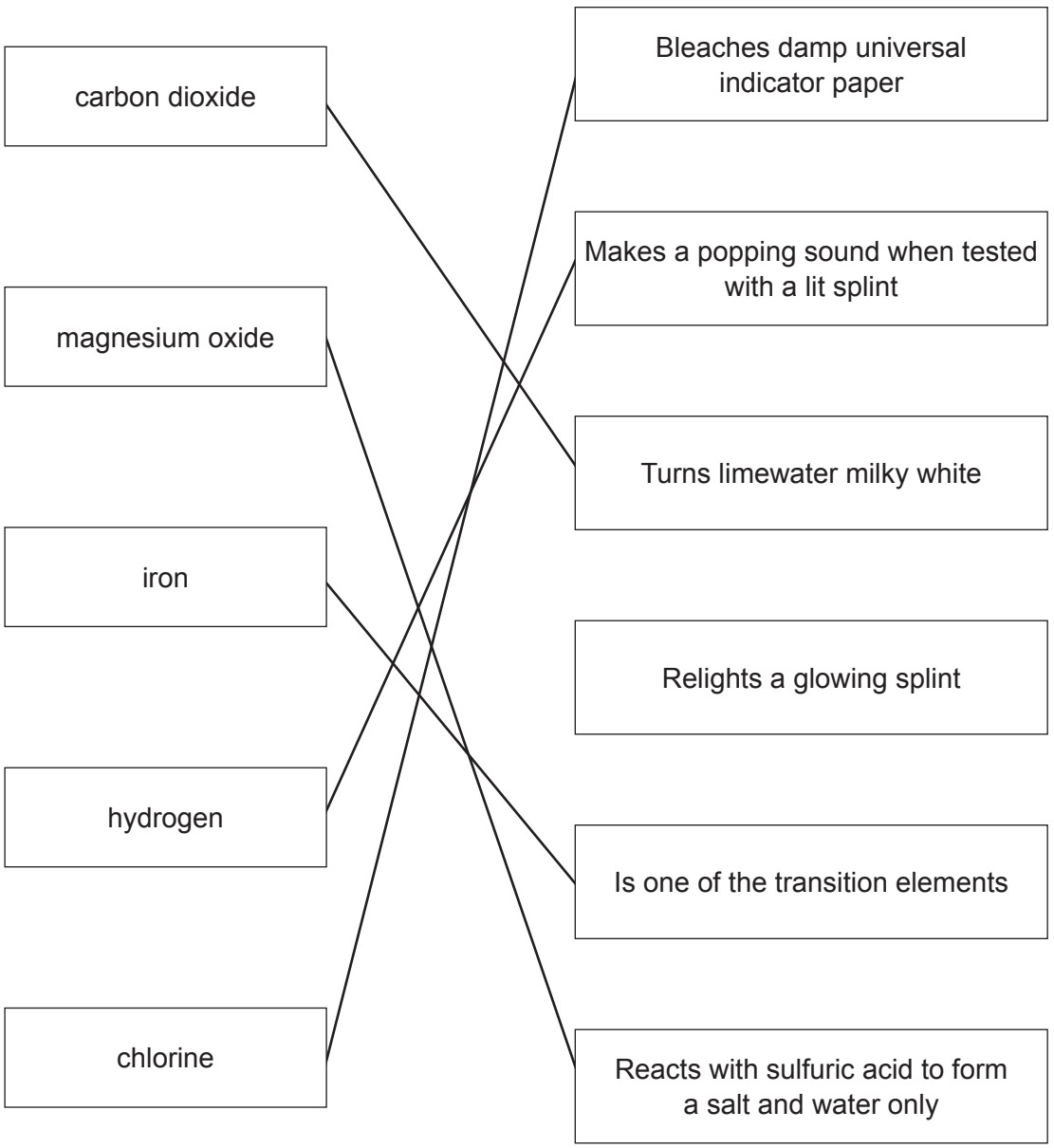
The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

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.

1 **Substance** **Statement**



[5]

AVAILABLE MARKS

5

			AVAILABLE MARKS
2	**(a)**		

Particle	Relative charge	Relative mass
proton	**+1** [1]	1
neutron	0	**1** [1]
electron	**–1** [1]	$\frac{1}{1840}$

[3]

(b) **(i)**

Particle	Number present in an atom of fluorine
proton	**9** [1]
neutron	**10** [1]
electron	**9** [1]

[3]

(ii) idea that there are the same number of protons as electrons [1]

(iii) F [1] 8

3 **(a)** **(i)** Clear idea that not all the elements had been discovered [1]

(ii) Any **three** of:
no gaps for undiscovered elements
more elements/more blocks
transition metals in a separate **block**
arranged by atomic number
idea of Group O the noble gases being present
idea of having elements swapped (e.g. I & Te)
or other correct, e.g. Mendeleev equivalents
Any 3 × [1] [3]

(b) outer electrons [1] 5

4 **(a)** 3 [1]

(b) 5 [1]

(c) hydrogen, nitrogen, oxygen, sodium, carbon – all needed [1]

(d) aqueous/dissolved in water/in solution [1]
accept phonetic spelling of ‘aqueous’ but NOT ‘aqua’ ‘aquat...’

(e) sodium carbonate [1] 5

				AVAILABLE MARKS
5	**(a)**	**(i)** (paper) chromatography [1]		
		(ii) idea that the ink could “run”/move up the paper/dissolve in the water [1]		
	(b)	brown [1]		
	(c)	A [1] idea that it does not move as far up the paper [1] **Second mark dependent on first**	[2]	5
6	**(a)**	a few hundred [1]		
	(b)	Any **three** of: They absorb **ultraviolet** radiation They spread more easily/cover the skin better Less is needed They are transparent 3 × [1]	[3]	
	(c)	Idea that they pass through the skin/travel around the body (more easily) [1] Idea that they could be **toxic** (NOT just “harmful”) to some types of cells, e.g. skin, bone, brain, liver [1] NOT ‘toxic’ on its own, NOT ‘damages cells’	[2]	6

7 **(a)** correct diagram for sodium atom [1] sulfur atom [1] [2]

AVAILABLE MARKS

(b) **Indicative Content**

1. • Correct direction of transfer
   • Sodium loses 1 electron
   • Sulfur gains 2 electrons
   • Two sodium atoms required
   • Correct formula Na_2S
   • Sodium ion Na^+
   • Sulfide ion S^{2-}

2. • Soluble in water
   • White solid
   • High **melting** point
   • Conduct electricity when molten/in solution or does not conduct electricity when solid

Or other correct, e.g. brittle
Max. 3 IPs for properties

Response	Mark
Candidates must use appropriate scientific terms throughout to describe the bonding of sodium with sulfur using **8–10** of the points in the indicative content .They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use **5–7** points from the indicative content to describe the bonding of sodium with sulfur using some scientific terms. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates use **2–4** of the points from the indicative content to describe the bonding of sodium with sulfur. They use limited spelling, punctuation and grammar and make little use of scientific terms. The form and style are of a limited standard.	[1]–[2]
Response not worthy of credit.	[0]

[6] 8

			AVAILABLE MARKS
8	**(a)**	a **shared pair** of electrons [1]	
	(b)	correct sharing [1] correct total number of electrons [1] this mark depends on correct sharing dot/cross [1] this mark is independent of the other two as long as the molecule is an attempt at HCl [3]	
	(c)	non-metal [1] large (or equivalent) [1] energy [1] weak (or equivalent) [1] van der Waals' **Accept**: intermolecular [1] [5]	9
9	**(a)**	(Average) mass of an **atom** [1] compared with (that of the) carbon-12 (isotope) [1], which has a mass of exactly 12 [1] **or** The (average) mass of an **atom** (of an element) [1] compared to 1/12 of the mass [1] of (the) carbon-12 (isotope) [1] N.B. if candidate refers to the mass of the nucleus (of an atom) do not penalise. In the 2nd marking point NB explicit idea of **comparison** with carbon-12 is needed for the carbon-12 mark; In the 3rd marking point allow "which has a mass of 12.000" but **do not** credit "which has a mass of exactly 12 g"; [3]	
	(b)	**(i)** 100 [1]	
		(ii) 148 [1]	
	(c)	**(i)** 5 [1]	
		(ii) 80% If answer wrong up to 2 method marks can be awarded For $\frac{12 \times 100}{30}$ = 40% Award [2] For $\frac{24 \times 100}{30}$ = (wrong answer) [2] For $\frac{n \times 100}{30}$ = 33.3% [1] i.e. correct computation where n is not 12 or 24 For 12 x 2 = 24 [1] For $\frac{12 \times 100}{30}$ = (wrong answer) [1] [3]	9
		Total	**60**