Rewarding Learning

General Certificate of Secondary Education
2016–2017

Science: Single Award

Unit 2 (Chemistry)

Higher Tier

[GSS22]

THURSDAY 18 MAY 2017, 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	(a)	(i)	C and E (any order) [1]		
		(ii)	Repeat the experiment [1]		
		(iii)	**Small** molecules/monomers [1] joining together (in long chains) [1] [2]		
	(b)	(i)	9.0 + 13.5 + 10 + 18.5 + 5.5 + 35 = 91.5 [1] 8.5% [1] [2]		
		(ii)	Polypropene is brittle **below 5 °C** [1]		7
2	(a)		Cheap/low density/resistance to water damage [1]		
	(b)		Aluminium [1] has a high resistance to water so will be ok outside in the rain [1] aluminium is light and will be easier to carry around [1] [3]		4
3	(a)	(i)	7 points plotted correctly [1] all points plotted correctly [2] smooth curve through all points [1] [3]		
		(ii)	4.6–4.8 cm [1]		
	(b)	(i)	As the amount/mass of **sodium hydrogencarbonate** added increases so does **the height of the honeycomb** [1] up to 6 cm/25 g where the graph levels off [1] [2]		
		(ii)	This makes the maximum height of honeycomb/using more sodium hydrogencarbonate wouldn't make any more [1] would cost the company more money [1] [2]		
	(c)		Sodium citrate [1] carbon dioxide and water [1] (**any** order) [2]		10

AVAILABLE MARKS

4 Indicative content:

Flame test
- use a flame test rod/inoculating loop
- clean rod/dip into (concentrated) acid
- dip the rod into the metal solution/sample
- place into **blue** Bunsen flame

or

Flame test (alternative method)
- use a spray bottle
- make solution of sample
- spray into flame
- into blue Bunsen flame

Results
- calcium – (brick) red
- lead – white/blue-white

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the process using **5 or 6** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe **3 or 4** of the points above, 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 describe the method using **1 or 2** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

5 (a) Light [1]

(b) Show if baby's food is hot [1] won't **burn** baby [1] [2]

(c) Particles are 1×10^{-9} m [1] to produce new **properties** [1] [2] 5

			AVAILABLE MARKS
6	**(a)** DNA [1]		
	(b) Because the **bands/bars** match (exactly) [1] everyone's **genetic** (fingerprint) is unique [1] [2]		
	(c) **For** Computers can compare thousands of DNA fingerprints per second/ helps solve crimes faster (any **one**) [1]		
	Against Contains confidential information about people/information may get; into the hands of criminals/misused (any **one**) [1] [2]		
	(d) Saliva/semen/skin [1]		6
7	**(a)** **(i)** A substance that contains two or more (different) elements [1] **chemically** joined/bonded/combined together [1] [2]		
	(ii) Any diatomic element [1]		
	(b) **(i)** 3 [1]		
	(ii) 6 [1]		5
8	**(a)** 37 [1]		
	(b) Group I [1]		
	(c) C [1]		
	(d) C [1]		4
9	**(a)** **(i)** X [1]		
	(ii) X [1]		
	(b) W is permanent hard water [1] only [1] cannot be softened by boiling [1] [3]		
	(c) Calcium carbonate [1] Carbon dioxide [1] [2]		
	(d) Caves/stalactites/stalagmites (or other suitable) [1]		8

				AVAILABLE MARKS
10	**(a)**	**(i)**	Using electricity [1] to break down/decompose a substance [1] [2]	
		(ii)	Oxygen/carbon dioxide [1]	
	(b)	**(i)**	Blue to colourless (in this order) [1]	
		(ii)	Grey to pink/brown (in this order) [1]	
	(c)		Sodium loses one electron [1] chlorine gains one electron [1] idea of transfer [1] [3]	8

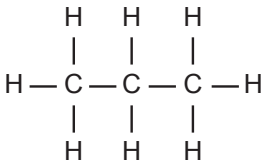
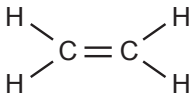
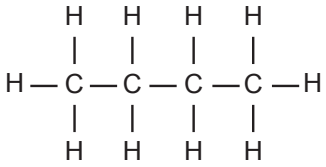
11 Indicative Content

- hydrocarbons made up of carbon and hydrogen **only**
- crude oil is separated by fractional distillation
- crude oil is first heated/evaporated
- it separates into different fractions at different levels/temperatures
- each fraction has a different boiling point/condensation point
- any two named fractions (**refinery gas**/naphtha/diesel/lubricating oil/tar (bitumen)

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the process using **5 or 6** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe **3 to 4** of the points above, 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 describe the method using **1 or 2** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

12 (a)

Name of hydrocarbon	Molecular formula	Structural formula
propane [1]	C_3H_8	
ethene	C_2H_4 [1]	
butane	C_4H_{10}	 [1]

[3]

(b) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

LHS [1] RHS [1] Correct balancing if both sides are correct [3]

AVAILABLE MARKS
6
75

Total