Rewarding Learning

General Certificate of Secondary Education
2013

Double Award Science: Chemistry

Unit C2

Foundation Tier

[GSD51]

MONDAY 10 JUNE 2013, 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)	To remove oxygen or air	[1]	
		(ii)	To remove water (moisture)/keep test tube dry	[1]	
		(iii)	Water and oxygen/air (Allow moisture/dampness)	[1]	
		(iv)	Oxidation	[1]	
	(b)		Painting [1] Galvanising [1] **or** other correct, e.g. plastic coating **not** oil/grease/varnish **not** sacrificial protection	[2]	
	(c)	(i)	Black [1] to pink/reddish orange/red-brown/orange-brown [1]	[2]	
		(ii)	Copper [1] Water [1] either order	[2]	10
2	(a)		No [1] Yes [1] Yes [1] No [1]	[4]	
	(b)		Rate = $\frac{1}{\text{Time}}$	[1]	5
3	(a)	(i)	Hydrogen	[1]	
		(ii)	Idea of producing the steam	[1]	
		(iii)	White allow yellow	[1]	
		(iv)	Magnesium/aluminium/iron	[1]	
	(b)	(i)	Any **two** of: (burns with) a bright/white light/flame [1] to form a white powder/ash/solid [1] allow white smoke heat given out/exothermic reaction [1] idea of (very) vigorous reaction [1] (max 2 × [1]) **not** sparks	[2]	
		(ii)	$2Mg + O_2 \rightarrow 2MgO$ [1] for MgO and [1] for balancing if formula is correct	[2]	8

AVAILABLE MARKS

4 **(a)** **(i)** Exothermic [1]
Endothermic [1]
Exothermic [1] [3]

(ii) Thermal [1] decomposition [1] [2]

(iii) Carbon dioxide [1]

(b) **(i)** Building material/neutralising acidic soils/**or** other correct, e.g. used in blast furnaces/making cement/tiles/toothpaste/paint [1]

(ii)

Effect of Quarrying	**Positive**	**Negative**
Produces a cheap material with many uses	✓	
Disused quarries can be used for landfill	✓ [1]	
Natural habitats disrupted		✓ [1]
Creates jobs in the community	✓ [1]	
Produces dust		✓ [1]
Quarries can be unsightly		✓ [1]

[5] 12

5 **(a)**

Gas	**Test**	**Result**
oxygen	Use a **glowing** splint [1]	**Relights** [1]
hydrogen	**Use a lit splint/taper** [1]	**Pops** [1]

[4]

(b) A = delivery tube/glass tube [1]
B = (graduated) syringe/gas syringe [1]
C = conical flask [1]

(c) **(i)** Blue [1]

(ii) Yellow solid [1]

(iii) Glows [1]

(iv) Iron(II) sulfide [1]

(v) A pungent smell [1]

(vi) Acid rain [1]

(vii) Removed from fuels [1] 14

AVAILABLE MARKS

6 (a) Indicative content

- Water containing calcium and/or magnesium ions **or** does not form a lather easily with soap/**or** forms a scum with soap
- Same volume of two water samples unless wrongly qualified
- Addition of soap (solution)
- Idea of 1 cm^3 at a time/idea of one fixed volume of soap
- Shaken/stir
- Addition repeated until a permanent lather is formed – or measure height of lather
- Correct statement of results: the sample needing most soap to lather is hard **or** converse/**or** sample with least lather is hard **or** converse

Response	Mark
Candidates must use specialist terms throughout to fully explain definition of hard water and describe a fair test which you could carry out to find which is a hard water sample in a logical sequence (6 or 7 indicative points are required). They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use some specialist terms to explain the definition of hard water and describe a fair test which you could carry out to find which is the hard water sample in a logical sequence (4 or 5 indicative points are required). They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates explain the definition of hard water or describe a fair test which could be carried out to find which is a hard water sample. 1–3 indicative points are required. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
Response not worthy of credit	[0]

[6]

(b) (i) Calcium/magnesium ion **or** Ca^{2+}/Mg^{2+} [1]

(ii) Good for teeth and bones/reduces heart disease [1]

(iii) Brewing/**or** other correct, e.g. bottled water, water softening/soap making Allow plumbing [1]

(iv) An advantage of soft water [1] related to less cost [1]
e.g. Less soap is needed to form lather [1]
Idea that householder spends less money on soap [1]
or
e.g. Idea that in hard water town limescale builds up on pipes [1]
Pipes may have to be replaced [1]
or
Fur in kettle [1] **not** scum
More electricity required to boil kettle [1]
or other correct, e.g. having to replace/use more energy with an electrical device which uses hot water gets the expense mark. [2]
Problem caused by the water needed for second mark

11

			AVAILABLE MARKS
7	**(a)**	Mass of an atom [1] compared with that of a carbon-12 isotope [1] which has mass of exactly (clearly implied) 12 [1] [3]	
	(b)	**(i)** 63 [1]	
		(ii) 40.5 [1] g [1] [2]	6
8	**(a)**	Nitrogen [1] 79% ± 1% [1]	
		Oxygen [1] 20% ± 1% [1] [4]	
	(b)	**(i)** Idea that between 1750 and 1900 there was a gradual increase [1] Idea that 1900–2000 – greater increase in CO_2 level [1] Idea of increase over time gains [1] NB Answer which links CO_2 with temperature gains no credit [2]	
		(ii) Idea that as carbon dioxide level increases global temperature increases [1] **not** idea that as temperature increases so does carbon dioxide level	
		(iii) Burning of (more) fossil fuels/deforestation **or** other correct, e.g. idea of more vehicles **not** population increase [1]	
		(iv) Idea of melting of polar ice caps/sea levels rising/flooding in low lying areas/droughts in some areas/ecosystems will change **or** other correct [1]	
	(c)	**(i)** Soluble in water/accept idea of non-toxic/no smell/colourless/ tasteless [1]	
		(ii) Carbonic acid [1]	
		(iii) Limewater is colourless [1] **not** clear Turns milky or cloudy [1] **not** just white [2]	
		(iv) Then turns colourless/idea that cloudiness disappears/precipitate dissolves [1]	14

					AVAILABLE MARKS
9	(a)	(i)	Fractional [1] distillation [1]	[2]	
		(ii)	Idea of crude oil being heated until it boils [1] Idea of compounds/fractions having different boiling points [1]	[2]	
	(b)	(i)	Idea that fossil fuels have been formed from living organism	[1]	
		(ii)	Carbon	[1]	
		(iii)	Clear idea that the resource is finite **not** idea that it can only be used once	[1]	
	(c)	(i)	It burns to give out energy/burning ethanol produces less carbon dioxide than natural gas/other fuels/it can be obtained from crops/it can be used in cars/**or** other correct, e.g. idea that it is renewable **or** that it saves using fossil fuels	[1]	
		(ii)	Idea of cost of production/idea that using food crops could mean that people could go hungry/**or** other correct	[1]	
		(iii)	Idea that burning hydrogen does not produce any carbon dioxide/ greenhouse gases **or** only product is water – non-polluting	[1]	10
				Total	**90**