Rewarding Learning

General Certificate of Secondary Education
2015

GCSE Chemistry

Unit 1

Foundation Tier

[GCH11]

TUESDAY 9 JUNE, AFTERNOON

MARK SCHEME

General Marking Instructions and Mark Grids

Introduction
Mark schemes are intended to ensure that the GCSE examination is marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria that they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these marking instructions.

Quality of candidates' responses
In marking the examination papers, examiners should be looking for a quality response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking
Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking
Examiners must be positive in their marking, giving appropriate credit for description, explanation and analysis, using knowledge and understanding and for the appropriate use of evidence and reasoned argument to express and evaluate personal responses, informed insights and differing viewpoints. Examiners should make use of the whole of the available mark range of any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks
Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark scheme
Mark schemes for questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

1 **(a)**

Characteristic of the Scientist's Periodic Table	Name of Scientist
Law of octaves	Newlands [1]
Spaces for undiscovered elements	Mendeleev [1]

[2]

(b) A in hydrogen position [1]
B in lithium position [1]
C in magnesium position [1]
D in mercury position [1] [4]

(c) Q and U [1] both required
P [1]
T [1]
R [1] [4]

(d) **(i)** yellow [1] solid [1] [2]

(ii) magnet [1]
iron attracted to magnet [1] [2]

(iii) iron sulf**ide** [1]

AVAILABLE MARKS

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AVAILABLE MARKS

2 **(a)** **(i)** copper(II) oxide (accept copper oxide)/potassium hydroxide [1]
Do not accept CuO/KOH

(ii) copper(II) chloride (accept copper chloride)
Do not accept $CuCl_2$ [1]

(iii) magnesium + sulfuric acid $\rightarrow$ magnesium sulfate + hydrogen
correct names of reactants as displayed in a word equation [1]
correct names of products as displayed in a word equation [1] [2]

(iv) limewater [1] changes from colourless [1] to milky [1] [3]

(b) **(i)** $CuCO_3 + 2HNO_3 \rightarrow Cu(NO_3)_2 + CO_2 + H_2O$
correct formulae of reactants [1]
correct formulae of products [1]
correct balancing [1] [3]

(ii) A = filter paper [1]
B = residue [1]
C = conical flask [1]
D = filter funnel [1]
E = filtrate [1] [5]

(c) **Indicative content**

- make a solution of the solid
- add sodium hydroxide (solution)
- white precipitate
- add excess sodium hydroxide (solution)
- precipitate does not redissolve confirms magnesium ions present
- add silver nitrate (solution to fresh sample of solution)
- yellow precipitate confirms iodide ions present

Response	Mark
Candidates must use appropriate specialist terms to explain fully the process of confirming the presence of both ions (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 must use appropriate specialist terms to explain fully the process of confirming the presence of the ions (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 process of confirming the presence of the ions (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 limited standard.	[1]–[2]
Response not worthy of credit	[0]

[6]

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AVAILABLE MARKS

3 **(a)** **(i)** $\mathbf{2}H_2O_2 \rightarrow \mathbf{2}H_2O + O_2$
correct balancing [1]

(ii) HO [1]

(b) **(i)**

Substance	Chemical Formula	Relative Formula Mass
Sodium fluoride	NaF [1]	42 [1]
Sodium hydrogen carbonate	$NaHCO_3$ [1]	84
Hydrated silica	$SiO_2.2H_2O$	96 [1]
Sodium lauryl sulfate	$CH_3(CH_2)_{11}SO_4Na$	288 [1]

[5]

(ii) contains water in the crystal/structure [1]
water chemically bonded [1] [2]

(iii) $\frac{2 \times 18\,[1]}{96} \times 100 = 37.5\,[1]\,\%$ [2]

(iv) 5 [1]

(c) **(i)** (3.12 g – 2.04 g) = 1.08 [1] g [1]

(ii) $\frac{1.08}{18\ [1]} = 0.06$ [1] mol [2]

(iii) $\frac{2.04}{102\ [1]} = 0.02$ [1] mol [2]

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AVAILABLE MARKS

4 **(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
allow **maximum** for the idea of **saturate** [4]

(b)

Substance	Soluble	Insoluble
Sodium chloride	✓	
Lead sulfate		✓ [1]
Potassium carbonate	✓ [1]	
Ammonium nitrate	✓ [1]	
Calcium carbonate		✓ [1]

[4]

(c) **(i)** oxygen and carbon dioxide [1]

(ii) solubiliity decreases (as temperature increases) [1]

(iii) solubiliity increases (as temperature increases) [1]

(iv) oxygen [1]

(v) potassium iodide [1] 13

				AVAILABLE MARKS
5	**(a)**	**(i)**	number of protons [1]	
		(ii)	total number of protons and neutrons [1]	
		(iii)		

Particle	Relative Mass	Relative Charge
neutron [1]	1	0
proton [1]	1 [1]	+1

3 correct = [2]
2 correct = [1]
1 correct = [0] [2]

(b) **(i)** $MgCl_2$ [1]

(ii) Correct electronic configuration of magnesium atom **drawn** as 2,8,2 [1]
Correct electronic configuration of chlorine atom **drawn** as 2,8,7 and 2 Cl atoms shown [1]

Correct electronic configuration of magnesium ion **drawn** as 2,8 [1]
Correct electronic configuration of chloride ion **drawn** as 2,8,8 [1]
(shown as dot and cross)

Correct charge on magnesium ion $^{2+}$ [1]
Correct charge on chloride ion $^{-}$ [1] **max** [6]

(iii) any **two** from the following points:
- conducts **electricity** when molten or in solution
- soluble in water
- brittle [2]

(iv) any correct ionic compound [1] 14

Total **80**