Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Chemistry

Assessment Unit AS 1

assessing

Basic Concepts in Physical and Inorganic Chemistry

[SCH12]

TUESDAY 22 MAY, 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 the 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 the 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.

Section A

	AVAILABLE MARKS
1 D	
2 D	
3 C	
4 D	
5 D	
6 D	
7 B	
8 B	
9 B	
10 A	
[1] for each correct answer [10]	10
Section A	**10**

Section B

AVAILABLE MARKS

11 **(a)** **(i)** Damp indicator (paper) [1] is bleached [1] [2]

(ii) Chlorine is green/green-yellow/yellow-green [1] [1]

(iii) Chlorine would condense [1]

(iv) Dissolve the chloride in water [1] add silver nitrate solution [1] white precipitate formed [1] [3]

(v) Heat the solid left in the tube in a test tube [1] test with a glowing splint [1] it does not relight [1] [3]

(vi) **Either**
Fill a test tube with chlorine monoxide [1] seal the end of the test tube [1] invert in a beaker of water [1] open the test tube to see how far the water rises [1]

Or
Bubble through H_2O [1]
stated volume of H_2O/until bubbles appear [1]
measured using a physical property, e.g. colour, pH, density, mass, volume, forming precipitate with $AgNO_3$(aq) [2] [4]

(b) **(i)** Chloric(I) acid [1]

(ii) Partial dissociation in solution (to form hydrogen ions) [2]

(iii) $2HOCl \rightarrow 2HCl + O_2$ [2]

(c) **(i)** When reacting an atom tends to gain, lose or share electrons to achieve 8 in its outer shell [2]

(ii)  [2]

(d) **(i)** Bent [1]

(ii) 8 [1]

(iii) The lone pairs repel the bonded pairs more [2]

(e) Electronegativity increases across a period [1]

Electronegativity decreases down a group [1] [2]

(f) Chlorine [1] ozone [1] [2] 31

			AVAILABLE MARKS
12	**(a)**	(s) (s) (g) (g) [1]	
	(b)	**(i)** 10.0 g in 25.0 cm^3; 40 × 10.0 g = 400 g in 1 dm^3 [1]	
		(ii) $(NH_4)_2Cr_2O_7$ = 2 × 18 + 2 × 52 + 7 × 16 = 36 + 104 + 112 = 252 400.0/252 = 1.59 [1]	
		(iii) Heat with sodium hydroxide solution [1] moist indicator paper/litmus/red litmus/UI paper [1] turns blue [1] [3]	
	(c)	**(i)** Atoms which have the same atomic number but a different mass number or contain the same number of protons but a different number of neutrons [2]	
		(ii) 100 – 99.632 = 0.368 [1]	
		(iii) 99.632 × 14 = 1394.848 0.368 × 15 = 5.52 = 1400.368 = 14.004 [2]	
		(iv) The RAMs in the table are listed as whole numbers (exception of chlorine) [1]	
	(d)	**(i)** Oxidation number in dichromate is +6; oxidation number in Cr^{3+} is +3; the oxidation number goes down when an oxidant reacts [2]	
		(ii) Oxidising agents gain electrons (which are supplied by the reducing agent) [1]	
	(e)	Low boiling point hence covalent [1]; liquid at room temperature hence covalent [1] [2]	17

AVAILABLE MARKS

13 **(a)** Sodium chloride has ions, it has a giant ionic lattice structure [2]
Diamond has atoms, it has a giant covalent structure [2]
Bromine has molecules in it, it has a molecular covalent structure [2] [6]

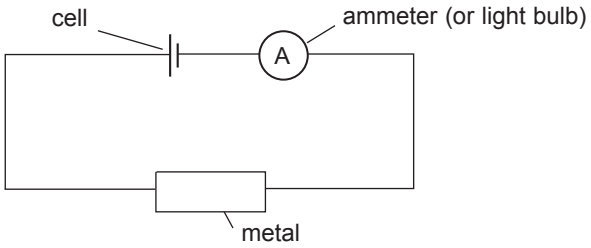
Band	Response	Mark
A	Candidates use 5 or more indicative points above. They use appropriate specialist terms and the spelling, punctuation and grammar and form and style are of a good standard.	**[5]–[6]**
B	Candidates use 3–4 indicative points above. They use appropriate specialist terms and the spelling, punctuation and grammar and form and style are of a satisfactory standard.	**[3]–[4]**
C	Candidates make reference to 1–2 indicative points above using limited spelling, punctuation and grammar and the form and style are of limited standard and they have made no use of specialist terms.	**[1]–[2]**
D	Not worthy of credit.	**[0]**

(b) Melting point; boiling point; hardness; electrical conductivity [3]

(c) **(i)** Delocalised electrons [1]; positive ions [1] [2]

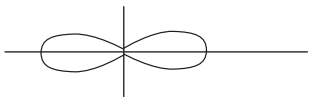
(ii) Magnesium has a greater conductivity [1]; there are more delocalised electrons [1] or magnesium produces 2 delocalised electrons compared to 1 with sodium [2]

(iii)



Labels [2]
Compare reading on ammeter (brightness of light bulb) [1] [3]

16

				AVAILABLE MARKS
14	**(a)**	**(i)** 	[1]	
		(ii) 	[1]	
		(iii) A region within an atom that can hold up to two electrons with opposite spins	[2]	
	(b)	**(i)** The extent to which an atom attracts the bonding electrons in a covalent bond	[2]	
		(ii) There is little difference in the electronegativities of carbon and hydrogen	[1]	
		(iii) The molecule is symmetrical and the polarities cancel out	[1]	
	(c)	**(i)** H—C≡C—H	[1]	
		(ii) nitrogen	[1]	
	(d)	Bubble into limewater [1] goes milky [1]	[2]	
	(e)	**(i)** **A** CH_4 = 16 hence lighter than air	[1]	
		(ii) **B** Cl_2 = 71 hence heavier than air	[1]	
	(f)	Lower mass [1] less/weaker van der Waals' forces [1]	[2]	16
			Section B	**80**
			Total	**90**