Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014

Chemistry

Assessment Unit AS 1

assessing

Basic Concepts in Physical and Inorganic Chemistry

[AC112]

MONDAY 9 JUNE, 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.

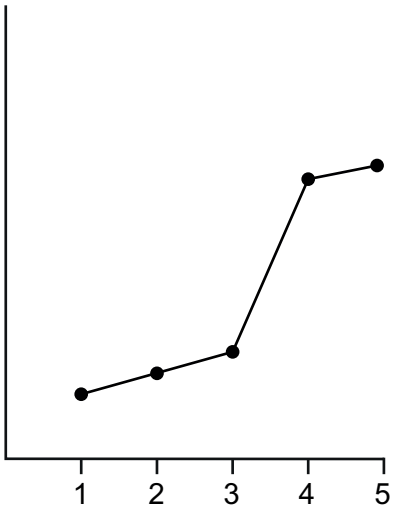
Section A

	AVAILABLE MARKS
1 D	
2 C	
3 C	
4 D	
5 D	
6 C	
7 B	
8 B	
9 B	
10 A	
[2] for each correct answer [20]	20
Section A	**20**

Section B

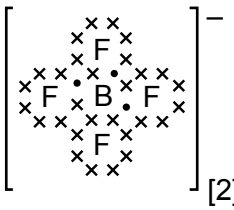
AVAILABLE MARKS

11 (a)



error [–1] [3]

(b) (i)



[2]

tetrahedral [1] 109°/109.5° [1] [4]

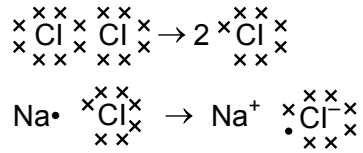
(ii) coordinate/dative (covalent) [1] 8

12 (a) (i) $P_4 + 6Br_2 \rightarrow 4PBr_3$ [2]
(unbalanced [–1])

(ii) atoms bond in order to get eight electrons [1] in outer shell [1]
P does obey (as it has eight electrons in outer shell) [1] [3]

(b) silicon has giant covalent structure [1]
requiring a lot of heat/energy to break bonds [1]
sulfur molecules (S_8) have larger RMM/more electrons than P_4 [1]
therefore greater/stronger van der Waals forces [1] [4]

Quality of written communication [2] 11

				AVAILABLE MARKS
13	**(a)**	**(i)**	regular arranged of positives/Na^+ [1] random delocalised electrons [1] electrostatic forces/attractive forces [1] [3]	
		(ii)	aluminium has more delocalised electrons [1] which can move and carry charge [1] [2]	
	(b)		molecular/simple covalent [1] [1]	
	(c)	**(i)**	 [3]	
		(ii)	ionic [1] [1]	
		(iii)	regular/repeated [1] structure of ions/particles [1] [2]	
		(iv)	soluble in water/polar solvents [1] high melting/boiling point [1] conducts electricity when molten/aqueous [1] [3]	
	(d)	**(i)**	$Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$ [2] (unbalanced [–1])	
		(ii)	5.3/106 = 0.05 [1] 0.06 × 1.5 = 0.09 [1] sodium carbonate [1] 0.09 [1] 0.09 × 58.5 = 5.265 (g) [1] [5]	22
14	**(a)**	**(i)**	$Br_2 + H_2O \rightarrow HBr + HBrO$ [1]	
		(ii)	Br oxidised from 0 (in Br_2) to +1 (in HBrO) [1] and reduced from 0 (in Br_2) to –1 (in HBr) [1] in same reaction [1] [3]	
	(b)		0.004 g dm^{-3} 0.004/160 = 2.5×10^{-5} mol dm^{-3} [2] (error [–1])	
	(c)	**(i)**	chlorine is a better/stronger oxidising agent than bromine/more reactive [1]	
		(ii)	2(35.5)/[23 + 2(35.5) + 3(12) + 3(14) + 3(16)] × 100% = 32.3% [2] (error [–1])	
	(d)		water [1] hydrogen bromide [1] sulfur dioxide [1] sodium hydrogensulfate [1] [4]	
	(e)		add silver nitrate solution [1] cream precipitate [1] does not dissolve in dilute NH_3 solution/dissolves in conc. NH_3 [1] solution [3]	16

					AVAILABLE MARKS
15	**(a)**	**(i)**	$Ca^{+}(g) \rightarrow Ca^{2+}(g) + e^{-}$ (missing state symbols [–1])	[2]	
		(ii)	590 + 1145 = 1735 [1] number moles calcium = 8/40 = 0.2 [1] energy = 0.2 × 1735 = 347 (kJ) [1]	[3]	
	(b)	**(i)**	$1s^2 2s^2 2p^6 3s^2 3p^6$	[1]	
		(ii)	$Ca^{(2+)}$ has more protons/greater nuclear charge [1] greater attraction for electrons [1]	[2]	
	(c)	**(i)**	atoms with same atomic number [1] different mass number [1]	[2]	
		(ii)	[(40 × 96.9) + (42 × 0.6) + (43 × 0.2) + (44 × 2.3)]/100 = 40.11	[2]	
		(iii)	23 20 20 (error [–1])	[2]	
	(d)	**(i)**	→	[1]	
		(ii)	electron releases energy [1] when dropping from a higher energy level [1] to a lower energy level [1]	[3]	
		(iii)	brick red	[1]	
		(iv)	$590/(6.02 \times 10^{23}) = 9.8 \times 10^{-22}$ kJ $= 9.8 \times 10^{-19}$ J [2] $f = E/h = (9.8 \times 10^{-19})/(6.63 \times 10^{-34}) = 1.48 \times 10^{15}$ [1] Hz or s^{-1} [1]	[2] [2]	23
				Section B	**80**
				Total	**100**