

MARK SCHEME for the October/November 2014 series

8780 PHYSICAL SCIENCE

8780/02

Paper 2 (Short Response), maximum raw mark 30

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

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prefix	symbol	power of ten		
centi	C	10^{-2}		
micro	μ	10^{-6}	[1]	
mega	M	10^6	[1]	
giga	G	10^9	[1]	[3]

award 1 mark for each correct row

- 2 any **two** from: [2]
 iron is melted/molten and treated with magnesium to remove sulphur
 oxygen blown through to oxidise carbon and phosphorus
 limestone added to remove the acidic oxides [2]
- 3 idea that the filament is cool and takes time to warm up [1]
 resistance of metals increases with (increasing) temperature [1] [2]
- 4 $C_7H_{16} + 11O_2 \rightarrow 7CO_2 + 8H_2O$ (allow multiples/fractions) [1]
 C_7H_{16} [1]
 balanced equation [2]
- 5 (a) 1.3 (m) [1]
- (b) $T = 4.0$ ms [1]
 $(f = 1/4.0 \times 10^{-3}) = 250$ (Hz) [1]
 for ecf it must be a clearly expressed value of T
- (c) 325 (ms⁻¹) ecf from (a) and (b) [1] [4]
- 6 (a) chlorine quoted as **both** oxidising and reducing agents [1]
 reducing agent = chlorine, as oxidation state goes from 0 to +1 [1]
 oxidising agent = chlorine as oxidation state goes from 0 to -1 [1]
allow 1 mark for correctly deducing oxidation states or correctly deducing oxidising and reducing behaviour from incorrect oxidation states
- (b) $2NaClO + H_2O_2 \rightarrow 2NaOH + Cl_2 + O_2$ [1]
 allow multiples/fractions [4]

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- 7 (a) (electric field strength =) (electric) force on a (stationary) unit positive charge [1]
- (b) (i) curved upwards within field [1]
 good curve and significantly less deflection than beta [1]
 e.g. hits plate in last 1/3 of plate [1]
- (ii) no deflection [1] [4]
- 8 (a) (hot) KOH dissolved in alcohol [1]
- (b) 3,3-dimethylbut-1-ene [1]
- (c) structure for 3,3-dimethylbutan-1-ol [1] [3]
- 9 (a) arrow pointing towards the centre of the circle (Moon) [1]
- (b) force is (always) perpendicular to the (direction of) motion/displacement in one orbit = 0 [1] [2]
- 10 (a) diagram showing three single covalent bonds and one lone pair on N [1]
- (b) extracts correct bond energy data for N–H, O=O, O–H [1]
 $-900 = 7160 - (5520 + 4b.e.)$ [1]
 $(4b.e. = 2540) b.e. = 635$ [1] [4]

[Total: 30]