CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary Level

MARK SCHEME for the October/November 2015 series

8780 PHYSICAL SCIENCE

8780/02 Paper 2 (Short Response), maximum raw mark 30

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

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1	frictional force increases as the speed increases	[1]	
	resultant force = zero or weight (downwards) = upward (frictional) force	[1]	**[2]**
2	Na Cr O 28.4/23 32.1/52 39.5/16	[1]	
	1.23 0.617 2.47 (2:1:4) so empirical formula Na_2CrO_4	[1]	**[2]**
3	charge passing a point when there is a current of 1 A for 1 s		**[1]**
4	diode	[1]	
	in reverse bias / only allows current to pass in one direction	[1]	**[2]**
5	**(a) (i)** unambiguous trigonal bipyramidal shape for PCl_5		**[1]**
	(ii) trigonal <u>bi</u>pyramid / trigonal <u>bi</u>pyramidal		**[1]**
	(b) unambiguous tetrahedral shape for PCl_4^+		**[1]**
6	evidence that correct reading from the scale / 6.8 mA	[1]	
	correct use of the graph giving T = 37 to 37.5 inclusive	[1]	**[2]**
7	**(a)** magnesium has one more proton than sodium / attract the (outer) electrons more strongly		**[1]**
	(b) aluminium loses its first electron from the (3)p orbital / sub-shell **OR** magnesium loses a (3)s electron first	[1]	
	the (3p) orbital is of higher energy (than the 3s) **OR** the (3p) electron is further from the nucleus (than the 3s) **OR** the (3p) electron has extra shielding from the 3s electrons	[1]	**[2]**
8	a closed triangle with arrows in the correct direction, which encompasses whole of weight vector	[1]	
	vector line tension correct length **and** direction ± 2 (°)	[1]	
	(correct length =) 166 ± 5 (N)	[1]	
	(correct direction =) 45 ± 2 (°)	[1]	**[4]**

9 **(a)** molecules with the same <u>molecular</u> formula but with different structural formulae **[1]**

(b) unambiguous formula for 2-methylbutane
e.g. $(CH_3)_2CHCH_2CH_3$. [1]

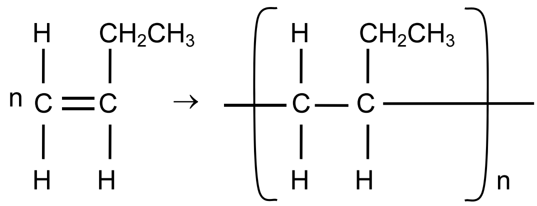
unambiguous formula for 2,2-dimethylpropane
e.g. $(CH_3)_2C(CH_3)_2$. [1] **[2]**

10 (voltmeter) reading goes down / p.d. decreases / goes to zero [1]
resistance decreases between B and S [1] **[2]**

11 **(a)** **(i)** (thermal) cracking **[1]**

(ii) $C_{17}H_{36} \rightarrow C_3H_6 + C_4H_8 + C_{10}H_{22}$
OR
$C_{17}H_{36} \rightarrow 2C_3H_6 + 2C_4H_8 + C_3H_8$ **[1]**

(b) **(ii)** $CH_2{=}CHCH_2CH_3$ [1]



correct central carbon bonding in the polymer [1] **[2]**

12 **(a)** alpha / α (particle) **[1]**

(b) nucleon number = 234 **and** proton number = 91 **[1]**