

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Advanced Subsidiary Level**

## **MARK SCHEME for the October/November 2012 series**

### **8780 PHYSICAL SCIENCE**

**8780/02**

Paper 2 (Short Response Questions), 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.

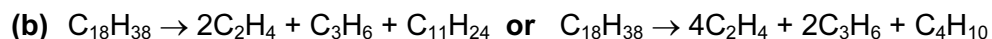
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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- 1 newton =  $\text{kg m s}^{-2}$  [1]  
 $k = F/rv^2 \rightarrow \text{kg m s}^{-2} / \text{m m}^2 \text{ s}^{-2} = \text{kg m}^{-2}$  [1]  
**[Total: 2]**
- 2 (a) velocity changes direction hence acceleration and force required [1]
- (b) horizontal from anywhere on the body of the female skater pointing towards the centre of the circle. [1]  
**[Total: 2]**
- 3 Al loses an electron in its (3)p orbital/sub-level, Mg loses a (3)s electron [1]  
The electron in the 3(p) is higher energy/further from nucleus than (3)s or is shielded [1]  
by (3)s<sup>2</sup> electrons  
**[Total: 2]**
- 4  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$  [1]  
**[Total: 1]**
- 5 (a) a species which gains electrons (in a reaction) [1]
- (b) (i) Any one from:  
 $2\text{Br}^- + \text{SO}_4^{2-} + 4\text{H}^+ \rightarrow \text{SO}_2 + 2\text{H}_2\text{O} + \text{Br}_2$   
 $2\text{Br}^- + \text{H}_2\text{SO}_4 + 2\text{H}^+ \rightarrow \text{SO}_2 + 2\text{H}_2\text{O} + \text{Br}_2$   
 $2\text{NaBr} + 2\text{H}_2\text{SO}_4 \rightarrow \text{SO}_2 + 2\text{H}_2\text{O} + \text{Br}_2 + \text{Na}_2\text{SO}_4$   
 $2\text{HBr} + \text{H}_2\text{SO}_4 \rightarrow \text{SO}_2 + 2\text{H}_2\text{O} + \text{Br}_2$  [1]
- (ii)  $\text{Br}^-$  ions/HBr molecules (lose electrons to form  $\text{Br}_2$  or  $\text{Br}_2 + \text{H}_2\text{O}$ ) [1]  
**[Total: 3]**
- 6 Torque of a couple = product of one of the forces and the perpendicular distance between the two forces. [1]  
**[Total: 1]**
- 7 Use of either  $v = \lambda \times 1/T$  or  $v = s/t$  [1]  
leading to  $v = 17(.1) \text{ m s}^{-1}$  [1]  
**[Total: 2]**
- 8 (a) breaking large/long molecules into shorter/smaller molecules [1]  
the smaller molecules are more useful/valuable than the long molecules [1]

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correct formulae for ethene and propene [1]

equation fully correct [1]

[Total: 3]

9 
$$\frac{(188 \times 1.5) + (189 \times 2.5) + (190 \times 3.0) + (192 \times 4.5)}{11.5} = 190.3$$

correct numerator [1]

fully correct [1]

[Total: 2]

10 (a) Find p.d. and read current from graph,  $R = V/I$  [1]

(b) thermistor/ semiconductor, resistance decreases as  $V$  increases. [1]

[Total: 2]

11 Potential difference is energy per unit charge [1]

Work done or energy transferred by the charge in going round a closed loop = energy given to it (by the source of emf) [1]

[Total: 2]

12 (a) HF has (strong) hydrogen bonding [1]

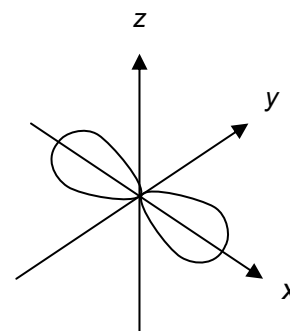
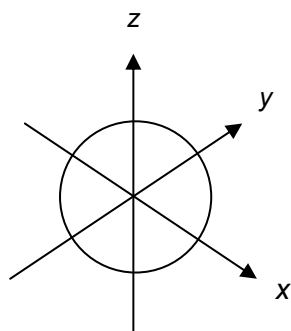
(b) HCl to HI have van der Waals' forces (between molecules) [1]

van der Waals' forces increase in strength with increase in number of electrons from HCl to HI. [1]

[Total: 3]

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13 correct spherical 's' and correct 'dumbbell' 'p'



*do not accept diagrams with multiple shapes on one set of axes*

[1]

**[Total: 1]**

- 14 Any orbits allowed in Rutherford model, only allowed orbitals in Bohr model (allow orbits/shells) [1]  
 No rules for electron numbers in Rutherford model, fixed numbers of electrons in each Bohr orbital [1]

**[Total: 2]**

15 (a) Fluctuations of readings / count rate on GM tube [1]

(b) The readings are **not** affected by external conditions (e.g. temperature, pressure) [1]

**[Total: 2]**