

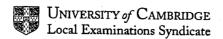
NOVEMBER 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0652/3
PHYSICAL SCIENCE
(EXTENDED)



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| 1 | (a) | 5.8-9.7 | 1 | , |
|---------------|---------|--|-------|--------------------------|
| | | metallic | 1 | |
| | | acid | 1 | |
| | (b) | idea that mp depends on structure and idea that there are different structures | (1) | |
| | 4 | gases (simple) molecular and metal giant (accept metallic) | (1) | max two marks here |
| | | gases weakly bound and metals strongly bound or gases weak force and metals strong forces | (1) | nere |
| | | idea of strength of metallic bond decreasing as the size of the ion increases => weaker electrostatic attraction | (1+1) | 5 |
| 2 | (a) | moment = force x (perpendicular) distance (accept F x d but not F x a) | 1 | - |
| | | 80 x 30 or 80 x 0.3 | 1 | |
| | | 2400 Ncm or 24 Nm (not N/cm etc. unit penalty) | 1 | |
| in the second | (b) (i) | rate of doing work / rate of transfer of energy / work over time or equivalent (not symbols unless defined) | 1 | |
| | (ii) | moment changes | 1 | |
| | | distance changes | 1 | max 2 |
| | | forces changes | 1 | 6 |
| | | | | J |

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| | | (ii) | line of negative slope (curved or straight) | 1 | | |
|---|------------------|-------|--|---|----|----|
| | | | passing through (0,(b)(i) value) and (1.5 s, 0) | 1 | | |
| | | (iii) | gravitational potential energy → heat (ignore mention of k.e.) | 1 | | |
| | | | of air or fruit or explanation that k.e. not gained because constant speed | 1 | | 40 |
| | | | *one unit penalty only for all the parts in this question | | | 12 |
| | | | | | | |
| | | | | | | |
| 5 | (a) | | to remove excess oxide or MgO not "to remove solid or residue" | | 1 | |
| | (b) | (i) | calcium sulphate is insoluble / not possible to separate (from oxide) by filtering | _ | 1 | |
| | | (ii) | add calcium nitrate (solution) to sulphuric acid | 1 | 1 | |
| | | | filter | | 1 | |
| | | 4 | dry residue by warming | | 1 | |
| | (c) | (i) | 40 (ignore unit) | | 1 | |
| 2 | . * * | (ii) | 0.2 (ignore unit) | | 1 | |
| | | (iii) | 0.2 mol H ₂ SO ₄ needed / ratio 1:1 | | 1 | |
| | | | 2 mol in 1000 cm ³ / vol = no of moles/concentration | | 1 | |
| | | | 100 cm ³ or 0.1 dm ³ (unit penalty) | | 1. | |

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| 6 | (a) | | mention of light | 1 | |
|---------|-----|-------|---|-----|-----------|
| | | | wave behaves as lenses /refraction of light rays etc | 1 | |
| | (b) | | use set up shown / project light on to screen | | |
| | | | measure distance between 2 light or dark bands | | |
| | | í | use of ruler / mention of middle or edges of bands | | |
| | | | improved by using several bands | 4 | |
| | | | idea of need to work out scaling | max | |
| | | | freezing using strobe | | |
| | (c) | | $v = f\lambda$ | 1 | |
| | | | 0.60 (or 0.5952) or 2.5/4.2 | 1 | |
| | | | multiplication by 60 | 1 | |
| | | | 36 (35.7) no unit penalty | 1 | 40 |
| | | | | | 10 |
| , | | | | | |
| 7 | (a) | (i) | CH₃OH | 1 | mandatory |
| State 5 | | (ii) | any shared pairs seen | 1 | |
| | | | all shells filled (each $H-2$, C and $O-8$) | 1 | |
| - | | (iii) | same functional group (OH) / same general formula (C _n H _{2n+2} O) / undergo similar reactions/ all alcohols/ similar chemical properties | 1 | |

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(b) (i)
$$C_2H_4 + H_2O \Rightarrow C_2H_5OH$$
 formulae correct 1 correctly balanced 1

(ii) high temperature not "heat"

catalyst

high pressure not "pressure"

(c) (catalytic) cracking of alkanes 1

8
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \text{ or } R_p = \frac{R_1 R_2}{R_1 + R_2}$$

$$R_p = 4 \Omega$$

$$R_t = 12 \Omega \text{ (or } 8 \Omega + R_p \text{ value) ecf wrong } R_p$$

$$V = IR$$
 (or arrangement)

$$I = 0.5 (A) ecf$$
 1

$$V = 2 (V) ecf$$

6

or any equivalent method with including 2 marks for relevant equations - answers alone gain two marks

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| 9 | (a) | | oxide forms layer which bonds to aluminium (or layer is tough and impermeable) | 1 | |
|---------|-----|--------|---|----|-------------|
| | | | rust (iron oxide) flakes of leaving another exposed surface/ rust traps water and air(O ₂) in contact with iron | 1 | |
| | (b) | | amphoteric oxides dissolve in alkalis | 1 | |
| | | | NaOH removes(dissolves) oxide (layer) / Al reacts with NaOH | 1 | |
| | (c) | (i) | bauxite | 1. | |
| | | (ii) | Al too (allow "very") reactive / bond with oxide too strong / too much energy is needed / carbon is not reactive enough to reduce aluminium oxide not "it is more reactive" | 1 | |
| | | | | | 6 |
| | | | | | |
| 10 | (a) | | induction | 1 | · |
| | | | changing | 1 | |
| | | ÷ 1, - | primary | 1 | |
| | | | voltage | 1 | |
| ∰ ser i | (b) | | $N_s/N_p = V_s/V_p$ or equivalent | 1 | |
| | | ÷ | 25 (ignore any unit) | 1 | |
| | | | | | 6 |
| | | | | | ٠. |
| | • | | | | Total 80 |