

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 80

SYLLABUS/COMPONENT : 0652/3

**PHYSICAL SCIENCE
(EXTENDED)**



UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

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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)	max two marks here
		gases (simple) molecular and metal giant (accept metallic)	(1)	
		gases weakly bound and metals strongly bound or gases weak force and metals strong forces	(1)	
		idea of strength of metallic bond decreasing as the size of the ion increases => weaker electrostatic attraction	(1+1)	
2	(a)	moment = force x (perpendicular) distance (accept $F \times d$ but not $F \times a$)	1	
		80×30 or 80×0.3	1	
		2400 Ncm or 24 Nm (not N/cm etc. unit penalty)	1	
	(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
		forces changes	1	2

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- 3 (a) (i) -2 or 2- 1
- (ii) +3 or 3+ 1
- (iii) FeCl₃ 1
- (iv) add (aqueous) ammonia or ammonium hydroxide 1 mandatory
- green precipitate 1
- orange/red/brown precipitate 1
- (b) Fe₂O₃ + 3C → 2Fe + 3CO
or
2Fe₂O₃ + 3C → 4Fe + 3CO₂ formulae correct 1
correctly balanced 1
- Fe₂O₃ + 3CO → 2Fe + 3CO₂
- (c) (i) limestone /calcium carbonate 1
- (ii) to remove impurities from ore 1
- 10
- 4 (a) (i) evidence of g → kg 1
- 1.2 x 10⁻² N or 0.012 N*
(12 N scores 1) 1
- (ii) as (a)(i) 1
- (iii) ½ mv² 1
- evidence of 0.2 squared 1
- 2.4 x 10⁻⁵ J* 1
- (b) (i) mgh 1
- 3.6 x 10⁻³ J* 1
ecf for mass from (a)(iii)
allow 3.6 J if mass penalised in (a)(iii)

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- (ii) line of negative slope (curved or straight) 1
- passing through (0,(b)(i) value) 1
and (1.5 s, 0)
- (iii) gravitational potential energy → heat 1
(ignore mention of k.e.)
- of air or fruit or explanation that k.e. not 1
gained because constant speed

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***one unit penalty only for all the parts
in this question**

- 5 (a) to remove excess oxide or MgO 1
not "to remove solid or residue"
- (b) (i) calcium sulphate is insoluble / not possible to 1
separate (from oxide) by filtering
- (ii) add calcium nitrate (solution) to sulphuric acid 1
filter 1
dry residue by warming 1
- (c) (i) 40 (ignore unit) 1
- (ii) 0.2 (ignore unit) 1
- (iii) 0.2 mol H₂SO₄ needed / ratio 1:1 1
- 2 mol in 1000 cm³ / vol = no of 1
moles/concentration
- 100 cm³ or 0.1 dm³ (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			
		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			
				10	
7	(a) (i)	CH ₃ OH	1	mandatory	
		(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 1+1

correctly balanced 1

(ii) high temperature not "heat"

catalyst

high pressure not "pressure" 2

(c) (catalytic) cracking of alkanes 1

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

$R_p = 4 \Omega$ 1

$R_t = 12 \Omega$ (or $8 \Omega + R_p$ value) ecf wrong R_p 1

$V = IR$ (or arrangement) 1

$I = 0.5$ (A) ecf 1

$V = 2$ (V) ecf 1

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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
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10	(a)	induction	1
		changing	1
		primary	1
		voltage	1
(b)		$N_s/N_p = V_s/V_p$ or equivalent	1
		25 (ignore any unit)	1

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Total
80