CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 80

SYLLABUS/COMPONENT : 0652/3

PHYSICAL SCIENCE (EXTENDED)

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)**

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)**

> **max two marks here**

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**

(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**

forces changes   **1**

> **max 2**

6

3 **(a)** **(i)** -2 or 2-   **1**

         (ii) +3 or 3+   **1**

         (iii) $FeCl_3$ **1**

         (iv) add (aqueous) ammonia or ammonium   **1**   mandatory
hydroxide

         green precipitate   **1**

         orange/red/brown precipitate   **1**

    (b) $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

              or

              $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$

| formulae correct **1** |
| correctly balanced **1** |

              $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

    (c) **(i)** limestone /calcium carbonate   **1**

         (ii) to remove impurities from ore   **1**

                                                10

4 **(a)** **(i)** evidence of g$\rightarrow$kg   **1**

         1.2×10^{-2} N or 0.012 N*   **1**
(12 N scores 1)

         (ii) as (a)(i)   **1**

         (iii) $\frac{1}{2}mv^2$ **1**

         evidence of 0.2 squared   **1**

         2.4×10^{-5} J*   **1**

    (b) **(i)** *mgh*   **1**

         3.6×10^{-3} J*   **1**
ecf for mass from (a)(iii)
allow 3.6 J if mass penalised in (a)(iii)

	(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**	
				12
		***one unit penalty only for all the parts in this question**		

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**
			filter	**1**
			dry residue by warming	**1**
	(c)	**(i)**	40 (ignore unit)	**1**
		(ii)	0.2 (ignore unit)	**1**
		(iii)	0.2 mol H_2SO_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**

10

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 max**

idea of need to work out scaling

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_3OH **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 ($C_nH_{2n+2}O$) / undergo similar reactions/ all alcohols/ similar chemical properties   **1**

(b) (i) $C_2H_4 + H_2O \rightarrow C_2H_5OH$ | formulae correct 1

correctly balanced 1 | **1+1**

(ii) high temperature not "heat"

catalyst

high pressure not "pressure" | **2**

(c) (catalytic) cracking of alkanes | **1**

9

8 $\dfrac{1}{R_p} = \dfrac{1}{R_1} + \dfrac{1}{R_2}$ or $R_p = \dfrac{R_1 R_2}{R_1 + R_2}$ | **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**

6

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

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**

          primary   **1**

          voltage   **1**

(b) $N_s/N_p = V_s/V_p$ or equivalent   **1**

          25 (ignore any unit)   **1**

                                                       6

                                                          Total 80