CHEMISTRY PAPER 3 TERM 1
MARKING SCHEME FOR FORM 4

TABLE 1

1. Initial temperature – ½ mk.
Final temperature – ½ mk.
Change in temperature – 2^0C. (1 mk)

(a) Enthalpy change = -50 x 4.2 x 2J. (1 mk)
= -420J (1 mk)
($^1/_2$ mk penalty for missing negative sign)

(b) Average volume of solution A.
$\frac{22.9+23.0+23.1}{3} = 23.0cm^3$ (1 mk)

(c) No of moles of solution A used.
$\frac{0.2 \times 23}{1000} = 0.0046\ moles$ (1 mk)

(d) $Na_2\ Co^3_{(aq)} + 2Hcl_{(aq)} \longrightarrow 2Nacl_{(aq)} + Co_{2(g)} + H_2O_{(l)}$
1:2 ($^1/_2$ mk)

No of moles of solution X that reacted in (c) above.
½ X 0.0046 moles = 0.0023 moles. ($^1/_2$ mk)

(e) Moles of solid X used in procedure I
0.0023 moles $\longrightarrow$ $25cm^3$
$\longrightarrow$ $250\ cm^3$
$\frac{0.0023 \times 250}{25} = 0.023\ moles$ (½ mk)

(f) molar heat of solution of Na2Co3
0.023 moles -420J ($^1/_2$ mk)
1 mole $\frac{-420}{0.023}$J (1/2 mk)
= -18 260.86$^-$J
= 18.2608 KJmol^{-1} (1 mk)

Qn 2

Time in minutes	0	½	1	1 ½	2	2 ½	3	3 ½
Temperature in ^{0}C	27.0	27.0	27.0	27.0	27.0		32.0	32.0

Time in minutes	4	4 ½	5	5 ½	6	6 ½	7
Temperature in ^{0}C	32.0	32.0	32.0	32.0	32.0	32.0	32.0

CT = 1mk
Trend = ½ mk
Use of decimals = 1 mk
1st reading = I 2^0C S.V ½ mk

(a) Graph
Labeled Axis – ($^1/_2$ mk for each)
Plotting – 1 mk
Shape – 1 mk

(b) DT = 5^0C. (1 mk)

(c) Heat change =
Total volume of solution = 40 + 60 = 100cm^3 ($^1/_2$ mk)
Mass of solution = 100g
Heat change = -100 X 4.2 X 5J ($^1/_2$ mk)
= -2100 J (1 mk)
= -2.1 KJ

(d) Heat of neutralization – 56KJ/mole.
1 mole produces 56 KJ
? 2.1 KJ

$\frac{1\times2.1}{56} = 0.0375\ moles$
(1 mk) (1 mk)

(e) molarity of NaoH
V – 40cm3
Moles – 0.0375
No of moles = $\frac{m\times v}{1000}$
0.0375 = $\frac{m\times40}{1000}$
M = $\frac{0.0375\times1000}{40}$ (1 mk)
= 0.9375M. (1 mk)

Qn 3

TEST	OBSERVATIONS	INFERENCE
(a) Heating solid k.	A colourless gas that turns moist red litmus paper to blue is produced. (1 mk)	$NH4^+$ present (1 mk)
(b) (i) Addition of NaOH	A white ppt ($^1/_2$ mk) which dissolves in excess. (½)	Al^{3+}, Zn^{2+} or Pb^{2+} present All 3 – 1mk 2 only – ½ mk ½ mk penalty for a wrong ion

(ii) Addition of Ammonia solution	A white ppt ½ mk which dissolves in excess ½ mk	Al^{3+}, Zn^{2+} or Pb^{2+} present. All 3 – 1mk 2 only – ½ mk ½ mk penalty for a wrong ion
(iii) Addition of $Ba(No_3)_2$ then HNO_3	A white ppt ½ mk which dissolves in excess ½ mk	Zn2+ present (1 mk)
(c) (i) Burning of solid P	Solid P burns with a sooty flame (1 mk)	| | C = c or | | -C≡ c – present ½ mk for one
(ii) (a) Addition of universal indicator	PH of 4 (1 mk)	Solution is weakly acidic (1 mk)
(b) Addition of $NaHCo_3$	Effervescence present	H^+ present

The graph of temperature against time.