

## 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<sup>0</sup>C. (1 mk)(a) Enthalpy change =  $-50 \times 4.2 \times 2$ J. (1 mk)

= -420J (1 mk)

(½ mk penalty for missing negative sign)

(b) Average volume of solution A.

(1 mk)

(c) No of moles of solution A used.

(1 mk)

(d)  $\text{Na}_2\text{CO}_3(\text{aq}) + 2\text{HCl}(\text{aq})$  $2\text{NaCl}(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$ 

1:2 (½ mk)

No of moles of solution X that reacted in (c) above.

½ X 0.0046 moles = 0.0023 moles. (½ mk)

(e) Moles of solid X used in procedure I

0.0023 moles

25cm<sup>3</sup>250 cm<sup>3</sup>

(½ mk)

(f) molar heat of solution of Na<sub>2</sub>CO<sub>3</sub>

0.023 moles

-420J (½ mk)

1 mole

J (½ mk)

= -18 260.86J

= 18.2608 KJmol<sup>-1</sup> (1 mk)**Qn 2**

Time in minutes	0	½	1	1 ½	2	2 ½	3	3 ½
Temperature in <sup>0</sup> 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 <sup>0</sup> 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  
 1<sup>st</sup> reading = I 2<sup>0</sup>C S.V ½ mk

(a) Graph  
 Labeled Axis – (½ mk for each)  
 Plotting – 1 mk  
 Shape – 1 mk

(b) DT = 5<sup>0</sup>C. (1 mk)

(c) Heat change =  
 Total volume of solution = 40 + 60 = 100cm<sup>3</sup> (½ mk)  
 Mass of solution = 100g  
 Heat change = -100 X 4.2 X 5J (½ mk)  
                   = -2100 J (1 mk)  
                   = -2.1 KJ

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

(1 mk)           (1 mk)

(e) molarity of NaoH  
 V – 40cm<sup>3</sup>  
 Moles – 0.0375  
 No of moles =  
 0.0375 =  
 M = (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)	NH <sub>4</sub> <sup>+</sup> present (1 mk)
(b) (i) Addition of NaOH	A white ppt (½ mk) which dissolves in excess. (½ )	Al <sup>3+</sup> , Zn <sup>2+</sup> or Pb <sup>2+</sup> present All 3 – 1mk 2 only – ½ mk ½ mk penalty for a wrong ion

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(ii) Addition of Ammonia solution	A white ppt $\frac{1}{2}$ mk which dissolves in excess $\frac{1}{2}$ mk	$Al^{3+}$ , $Zn^{2+}$ or $Pb^{2+}$ present. All 3 – 1mk 2 only – $\frac{1}{2}$ mk $\frac{1}{2}$ mk penalty for a wrong ion
(iii) Addition of $Ba(NO_3)_2$ then $HNO_3$	A white ppt $\frac{1}{2}$ mk which dissolves in excess $\frac{1}{2}$ mk	$Zn^{2+}$ present (1 mk)
(c) (i) Burning of solid P	Solid P burns with a sooty flame (1 mk)	C = c or -C c – present $\frac{1}{2}$ 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

