

# 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 x 4.2 x 2J. (1 mk)

$$= -420J \text{ (1 mk)}$$

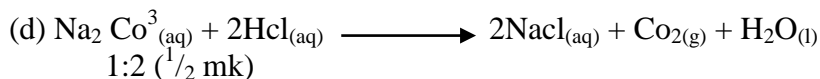
(½ mk penalty for missing negative sign)

(b) Average volume of solution A.

$$\frac{22.9+23.0+23.1}{3} = 23.0cm^3 \text{ (1 mk)}$$

(c) No of moles of solution A used.

$$\frac{0.2 \times 23}{1000} = 0.0046 \text{ moles (1 mk)}$$



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

$$\frac{1}{2} \times 0.0046 \text{ moles} = 0.0023 \text{ moles. (½ mk)}$$

(e) Moles of solid X used in procedure I

$$\begin{array}{l} 0.0023 \text{ moles} \longrightarrow 25cm^3 \\ \longrightarrow 250 cm^3 \end{array}$$


$$\frac{0.0023 \times 250}{25} = 0.023 \text{ moles (½ mk)}$$

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

$$\frac{0.023 \text{ moles} \quad -420J \text{ (½ mk)}}{1 \text{ mole} \quad \frac{-420}{0.023}J \text{ (1/2 mk)}}$$

$$\begin{array}{l} = -18\,260.86J \\ = 18.2608 \text{ KJmol}^{-1} \text{ (1 mk)} \end{array}$$

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 = 1 2<sup>0</sup>C S.V ½ mk

(a) Graph

Labeled Axis – ( $\frac{1}{2}$  mk for each)

Plotting – 1 mk

Shape – 1 mk

(b)  $DT = 5^{\circ}C$ . (1 mk)

(c) Heat change =

Total volume of solution =  $40 + 60 = 100\text{cm}^3$  ( $\frac{1}{2}$  mk)

Mass of solution = 100g

Heat change =  $-100 \times 4.2 \times 5J$  ( $\frac{1}{2}$  mk)

= -2100 J (1 mk)

= -2.1 KJ

(d) Heat of neutralization – 56KJ/mole.

1 mole produces 56 KJ

? 2.1 KJ

$$\frac{1 \times 2.1}{56} = 0.0375 \text{ moles}$$

(1 mk) (1 mk)

(e) molarity of NaOH

V – 40cm<sup>3</sup>

Moles – 0.0375

No of moles =  $\frac{m \times v}{1000}$

$$0.0375 = \frac{m \times 40}{1000}$$

$$M = \frac{0.0375 \times 1000}{40} \text{ (1 mk)}$$

= 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)	$\text{NH}_4^+$ present (1 mk)
(b) (i) Addition of NaOH	A white ppt ( $\frac{1}{2}$ mk) which dissolves in excess. ( $\frac{1}{2}$ )	$\text{Al}^{3+}$ , $\text{Zn}^{2+}$ or $\text{Pb}^{2+}$ present All 3 – 1mk 2 only – $\frac{1}{2}$ mk $\frac{1}{2}$ mk penalty for a wrong ion

(ii) Addition of Ammonia solution	A white ppt $\frac{1}{2}$ mk which dissolves in excess $\frac{1}{2}$ mk	$\text{Al}^{3+}$ , $\text{Zn}^{2+}$ or $\text{Pb}^{2+}$ present. All 3 – 1mk 2 only – $\frac{1}{2}$ mk $\frac{1}{2}$ mk penalty for a wrong ion
(iii) Addition of $\text{Ba}(\text{NO}_3)_2$ then $\text{HNO}_3$	A white ppt $\frac{1}{2}$ mk which dissolves in excess $\frac{1}{2}$ mk	$\text{Zn}^{2+}$ present (1 mk)
(c) (i) Burning of solid P	Solid P burns with a sooty flame (1 mk)	$\begin{array}{cc}   &   \\ \text{C} = & \text{c} \text{ or} \\   &   \end{array}$ $-\text{C}\equiv\text{c}-$ 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 $\text{NaHCO}_3$	Effervescence present	$\text{H}^+$ present

The graph of temperature against time

