

CHEMISTRY PAPER 3 TERM 1 MARKING SCHEME FOR FORM 4

TABLE 1

1. Initial temperature – ½ mk.

Final temperature – ½ mk.

Change in temperature – 2⁰C. (1 mk)

(a) Enthalpy change = -50 x 4.2 x 2J. (1 mk)

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

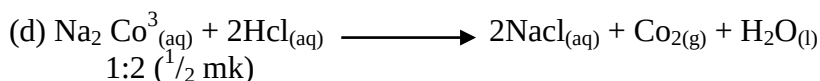
(½ mk penalty for missing negative sign)

(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 Na₂CO₃

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

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

Qn 2

Time in minutes	0	½	1	1 ½	2	2 ½	3	3 ½
Temperature in 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 = 1 2⁰C 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^3

Moles – 0.0375

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

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

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

$$= 0.9375M. \text{ (1 mk)}$$

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_4^+ present (1 mk)
(b) (i) Addition of NaOH	A white ppt ($\frac{1}{2}$ mk) which dissolves in excess. ($\frac{1}{2}$)	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

(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 $\text{Ba}(\text{NO}_3)_2$ 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)	$\begin{array}{cc} & \\ \text{C} = & \text{c} \text{ or} \\ & \end{array}$ $-\text{C}\equiv\text{c}-$ 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 NaHCO_3	Effervescence present	H^+ present

The graph of temperature against time

