**CHEMISTRY PAPER 3 TERM 1 2015**

**MARKING SCHEME FOR FORM 4 MWAKICAN**

**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 (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.

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

(d) Na2 Co3(aq) + 2Hcl(aq) 2Nacl(aq) + Co2(g) + H2O(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 25cm3

 250 cm3

 $\frac{0.0023 ×250}{25}=0.023 moles$ ( 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 0C | 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 0C | 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 20C S.V ½ mk

(a) Graph

Labeled Axis – (1/2 mk for each)

Plotting – 1 mk

Shape – 1 mk

(b) DT = 50C. (1 mk)

(c) Heat change =

Total volume of solution = 40 + 60 = 100cm3 (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

 $\frac{1×2.1}{56}=0.0375 moles$

 (1 mk) (1 mk)

(e) molarity of NaoH

 V – 40cm3

Moles – 0.0375

No of moles = $\frac{m×v}{1000}$

0.0375 = $\frac{m×40}{1000}$

M = $\frac{0.0375 ×1000}{40}$ (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 ) | Al3+, Zn2+ or Pb2+ present All 3 – 1mk2 only – ½ mk½ mk penalty for a wrong ion |

|  |  |  |
| --- | --- | --- |
| (ii) Addition of Ammonia solution  | A white ppt ½ mk which dissolves in excess ½ mk | Al3+, Zn2+ or Pb2+ present.All 3 – 1mk2 only – ½ mk½ mk penalty for a wrong ion |
| (iii) Addition of Ba(No3)2 then HNO3 | 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 NaHCo3 | Effervescence present | H+ present  |

