Name of the Student:_____
Max. Marks : 14 Marks **Time : 14 Minutes**

Mark Schemes

Q1.

(a) (i) $-\log[H^+]$

*Penalise missing [ ] here **and not elsewhere***

1

(ii) $[H^+][OH^-]$

1

(b) (i) $[H^+] = 2.34 \times 10^{-7}$

1

pH = 6.63

Penalise fewer than 3 sig figs but allow more than 2 dp

1

(ii) $[H^+] = [OH^-]$

1

(iii) **M1** $[H^+] = K_w/[OH^-]$

if upside down or CE, allow M3 only for correct use of their $[H^+]$

1

M2 $(= 5.48 \times 10^{-14}/0.140) = 3.91 \times 10^{-13}$

1

M3 pH = 12.4(1)

not 12.40 (AE from 12.407)

1

Penalise fewer than 3 sig figs but allow more than 3 sfs
For values above 10, allow 3sfs - do not insist on 2 dp.
For values below 1, allow 2dp – do not insist on 3 sig figs
Not allow pH = 14 – pOH but can award M3 only for pH = 13.1(46)
Can award all three marks if $pK_w = 13.26$ is used

(c) **M1** mol NaOH = mol OH^- = $(30 \times 10^{-3}) \times 0.20 = 6.0 \times 10^{-3}$

mark for answer

1

M2 mol $H_2SO_4 = (25 \times 10^{-3}) \times 0.15 = 3.75 \times 10^{-3}$

mark for answer

1

M3 mol $H^+ = (25 \times 10^{-3}) \times 0.15 \times 2 = 7.5 \times 10^{-3}$
OR XS mol $H_2SO_4 = 0.75 \times 10^{-3}$

if factor of 2 missed or used wrongly, CE - lose M3 and next mark

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gained. In this case they must then use K_w to score any more.
see examples below

1

M4 XS mol $H^+ = 1.5 \times 10^{-3}$

1

M5 $[H^+] = (1.5 \times 10^{-3}) \times (1000/55) = 0.0273$

if no use or wrong use of volume, lose M5 and M6 except if 1000 missed
AE –1 (pH = 4.56)

1

M6 pH = 1.56

Penalise fewer than 3 sig figs but allow more than 3 sfs
For values above 10, allow 3sfs - do not insist on 2 dp.
For values below 1, allow 2dp – do not insist on 3 sig figs

1

[14]

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