Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1_Acids And Bases

Name of the Student:____

Max. Marks : 16 Marks **Time : 16 Minutes**

Mark Schemes

Q1.

(a) $[H_2O]$ is (almost) constant

Allow
$[H_2O]$ is (very) large in comparison (to $[H^+]$ and $[OH^-]$)

***or** $[H_2O]$ is incorporated in K_w*
***or** $K_w = K_c[H_2O]$*
***or** the equilibrium lies <u>very</u> much to the left.*

***Ignore** water has negligible dissociation*
***Ignore** $[H_2O] = 1$ or $[H_2O]$ is very small 1*

1

(b) M1 Equilibrium is endothermic (in forward direction)

1

M2 <u>Equilibrium</u> shifts to the RHS to minimise/oppose temperature increase
***Ignore** more H^+ and OH^- formed*

1

(c) M1 pH = $-\log_{10}[H^+]$
M1 Allow pH = $-\log[H^+]$

1

M2 $[H^+] = \sqrt{5.48 \times 10^{-14}}$ (= 2.34×10^{-7})
M2 $[H^+]^2 = 5.48 \times 10^{-14}$

1

M3 pH = $-\log_{10} 2.34 \times 10^{-7} = 6.63$
M3 pH = $-\log_{10}$ M2

1

M4 $[H^+] = [OH^-]$
or
Dissociation of each water molecule gives one H^+ and one OH^-
M4 Allow equal amounts of H^+ and OH^-

1

(d) 5.55
Allow 5.5 to 5.6

1

(e) Different solutions must not contaminate each other
pH of previous solution doesn't contaminate new solution

or

To wash off any residual solution/substance (which could interfere with the reading)

Ignore to make neutral/neutralise

Ignore so as not to affect concentrations

1

(f) To avoid missing the end point

Or

(Very little pH change per cm^3 added at start) large change in pH (near end point)

1

(g) All have a colour change/pH range within the <u>steep/vertical</u> part of the titration curve

Colour change/pH range between pH 3 and 11

1

(h) M1 Amount of OH^- = $36.25 \times 0.200 \div 1000 = 7.25 \times 10^{-3}$ mol **<u>and</u>** Amount of H^+ = $25.0 \times 0.150 \div 1000 = 3.75 \times 10^{-3}$ mol

1

M2 Amount of excess OH^- = $7.25 \times 10^{-3} - 3.75 \times 10^{-3} = 3.50 \times 10^{-3}$ mol

1

M3 $[OH^-] = (3.50 \times 10^{-3}) \div (61.25 \times 10^{-3})$ $(= 5.71 \times 10^{-2}$ mol)

M3 $[OH^-] = (M2) \div (61.25 \times 10^{-3})$

1

M4 $[H^+] = \underline{1.00 \times 10^{-14}} \div 5.71 \times 10^{-2} = 1.75 \times 10^{-13}$

M4 $[H^+] = 1.00 \times 10^{-14} \div M3$

1

M5 pH = 12.76

M5 Allow pH = 12.8

M5 $pH = -\log_{10}(M4)$

Alternative Method

M4 p OH = 1.24

M5 pH = 14 – 1.24 = 12.76

1

[16]