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

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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

(a) **M1** $[H^+] = 0.0170$

1

M2 pH = 1.77
2 dp
Allow M2 for correct pH calculation from their wrong $[H^+]$ for this pH calculation only

1

(b) (i)

$$K_a = \frac{[H^+][X^-]}{[HX]^2} \quad \text{Ignore} \quad K_a = \frac{[H^+]^2}{[HX]}$$

Penalize missing [ ] here ***and not elsewhere***
Allow HA instead of HX

1

(ii) **M1** $[H^+] = 10^{-2.79}$ OR $1.6218\ldots \times 10^{-3}$
If $[H^+]$ wrong, can only score M2

1

M2 $K_a = \frac{[H^+]^2}{[HX]}$ OR $\frac{[1.62 \times 10^{-3}]^2}{[0.0850]}$
Allow HA instead of HX

1

M3 $K_a = 3.09 \times 10^{-5}$ 3sfs min
(allow 3.10×10^{-5} if 1.6218 rounded to 1.622)
Ignore units
If [HX] used as $(0.0850 - 1.62 \times 10^{-3})$
this gives $K_a = 3.15 \times 10^{-5}$
$(0.0016)^2/0.085 = 3.01 \times 10^{-5}$ scores 2 for AE

1

(c) **M1** mol OH^- $(= (38.2 \times 10^{-3}) \times 0.550)$

$= 2.10(1) \times 10^{-2}$ or 0.0210(1)
Mark for answer

1

M2 Mol H^+ $(= (25.0 \times 10^{-3}) \times 0.620)$

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= 1.55×10^{-2} or 0.0155

Mark for answer

1

M3 excess mol OH^- = $5.5(1) \times 10^{-3}$

Allow conseq for M1 – M2

***If wrong method** e.g. no subtraction or use of √*

can only score max of M1, M2, M3 and M4.

1

M4 $[OH^-] = 5.51 \times 10^{-3} \times \frac{10^3}{63.2}$ [= 0.08718 (0.0872)]

OR $[OH^-] = 5.5 \times 10^{-3} \times \frac{10^3}{63.2}$ = 0.0870(2)

(M1 – M2) / vol in dm^3 mark for dividing by volume

(take use of 63.2 without 10^{-3} as AE so 9.94 scores 5)

If no use or wrong use of vol lose M4 & M6

Can score M5 for showing (10^{-14}/ their XS alkali)

1

M5 $[H^+] = \frac{10^{-14}}{0.08718} = 1.147 \times 10^{-13}$

OR $\frac{10^{-14}}{0.0870} = 1.149 \times 10^{-13}$

OR pOH = 1.06

If no use or wrong use of K_w or pOH no further marks

1

M6 pH = 12.9(4) allow 3sf

If vol missed score max 4 for 11.7(4)

If acid– alkali reversed max 4 for pH = 1.06

Any excess acid – max 4

1

[12]

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Q2.

(a) C

1

A

1

D

1

(b) (i) Bromocresol green

Allow wrong spellings

1

(ii) Purple to yellow

Must have both colours:

Purple start – yellow finish

1

[5]

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