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 : 25 Marks **Time : 25 Minutes**

Mark Schemes

Q1.

(a) (i) B; **1**

C; **1**

A; **1**

(ii) cresolphthalein

OR

thymolphthalein; **1**

(b) (i) –log[H^+]; **1**

(ii) [H^+] = 1.259 × 10^{-12} (or 1.26 or 1.3)

OR

OH = 14 – pH; **1**

$$[OH^-] = \frac{10^{-14}}{1.258 \times 10^{-12}}$$

OR

= 2.10; **1**

= 7.9(4) × 10^{-3};
(if [H^+] is wrong allow 1 for [OH] = K_w/[H^+] or as numbers) **1**

(c) (i) $K_a = [H^+]^2/[CH_3CH_2COOH]$

OR

$[H+]^2/[HA]$

OR

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$[H^+] = [A^-]$ etc;

1

$[H^+]$ = $\sqrt{1.35 \times 10^{-5}} \times 0.117$ or expression without numbers;

1

$= 1.257 \times 10^{-3}$

pH = 2.90;

1

(iii) $K_a = [H^+]$

OR

pK_a = pH;

1

pH = 4.87;
(penalise 1dp once)

1

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Q2.

(a) Concentration of acid: $m_1v_1 = m_2v_2$ hence $25 \times m_1 = 18.2 \times 0.150$

OR

moles NaOH = 2.73×10^{-3};

1

$m_1 = 18.2 \times 0.150/25 = 0.109$;

1

(b) (i) $K_a = [H^+][A^-]/[HA]$ *not* $K_a = [H^+]^2 / [HA]$;

1

(ii) $pK_a = -\log K_a$;

1

(iii) $[A^-] = [HA]$;

1

hence $K_a = [H^+] [A^-] / [HA] = [H^+]$

and $-\log K_a = -\log[H^+]$;

1

(c) ratio $[A^-]$: [HA] remains constant;

1

hence as $[H^+] = K_a [HA] / [A^-]$; $[H^+]$ remains constant;

1

(d) (i) pH of 0.250 mol dm^{-3} HCl = 0.60
and pH of 0.150 mol dm^{-3} HCl = 0.82;

1

pH change = 0.22;

1

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(ii) moles HCl = $30 \times 0.250 \times 10^{-3} = v \times 0.150 \times 10^{-3} = 7.50 \times 10^{-3}$

OR

$v = 30 \times 0.250 \times 10^{-3} / 0.150 \times 10^{-3} = 50$;

1

water added = $50 - 30 = 20\ cm^3$;

1

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