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 : 19 Marks** **Time : 19 Minutes**

Q1.

At 40 °C the ionic product of water, $K_w = 2.92 \times 10^{-14}$ mol$^2$ dm$^{-6}$

(a) Give the expression for $K_w$

Calculate the pH of pure water at 40 °C
Give your answer to 2 decimal places.

$K_w$

pH _____

**(3)**

(b) 35.0 cm$^3$ of 0.150 mol dm$^{-3}$ aqueous sodium hydroxide are mixed with 20.0 cm$^3$ of a 0.100 mol dm$^{-3}$ solution of hydrochloric acid.
The temperature of the solution formed is 40 °C

Calculate the pH of the solution formed.
Give your answer to 2 decimal places.

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pH _____

**(5)**

**(Total 8 marks)**

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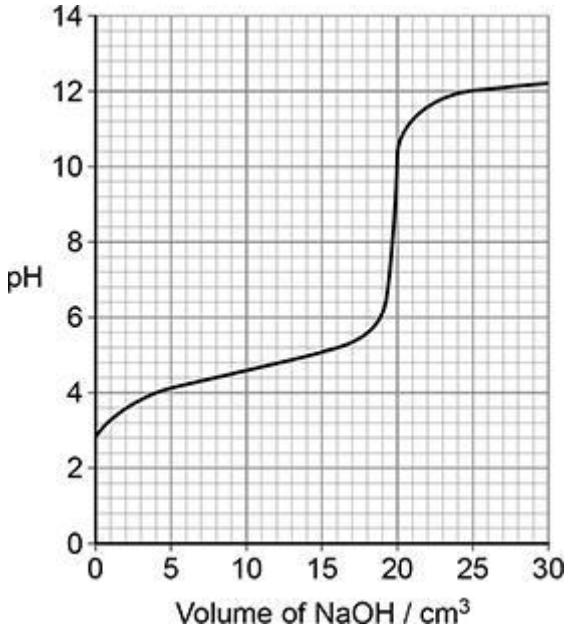
Q2.

The figure below shows how the pH changes as 0.100 mol $dm^{-3}$ sodium hydroxide solution is added to 25.0 $cm^3$ of 0.0800 mol $dm^{-3}$ aqueous propanoic acid at 298 K




(a) Propanoic acid is a weak acid.

State the meaning of weak in this context.

_____

_____

_____

**(1)**

(b) Suggest why a student doing an experiment to produce the curve in the figure above would add the sodium hydroxide solution dropwise around the equivalence point.

_____

_____

_____

**(1)**

(c) Give an expression for $K_a$ for propanoic acid ($CH_3CH_2COOH$).

Use this expression to show that pH = p$K_a$ when half of the propanoic acid has reacted with sodium hydroxide.

$K_a$

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**(3)**

(d) Use the pH from the figure above, when half of the propanoic acid has reacted, to calculate $K_a$ at 298 K

$K_a$ _____ mol $dm^{-3}$

**(2)**

(e) When sodium hydroxide solution is added to aqueous propanoic acid, the solution formed acts as a buffer when between 5 $cm^3$ and 15 $cm^3$ have been added.

Explain why the pH stays approximately constant during this part of the experiment.

_____

_____

_____

_____

_____

_____

**(2)**

(f) Methyl orange and universal indicator are **not** suitable indicators for the titration of solutions of propanoic acid with sodium hydroxide.

State the reason why each indicator is **not** suitable.

Methyl orange _____

_____

Universal indicator _____

_____

**(2)**

**(Total 11 marks)**

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