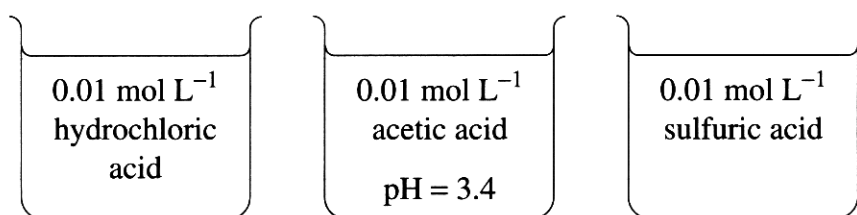# Chemistry

Section I – Part B (continued)

Marks

Question 22 (5 marks)

Solutions of hydrochloric acid, acetic acid and sulfuric acid were prepared. Each of the solutions had the same concentration (0.01 mol L^{-1}). The pH of the acetic acid solution was 3.4.

0.01 mol L^{-1} hydrochloric acid	0.01 mol L^{-1} acetic acid pH = 3.4	0.01 mol L^{-1} sulfuric acid

(a) Calculate the pH of the hydrochloric acid solution. $pH = -\log[H^+]$ **1**

.... $pH = -\log[0.01]$ ....
$= 1$
$pH = 1$.

(b) Compare the pH of the sulfuric acid solution to the pH of the hydrochloric acid   **2**
solution. Justify your answer. (No calculations are necessary.)

The pH of the sulfuric acid will be a little bit higher than the pH of HCL but lower than the pH of Acetic Acid. This is because both HCl & H$_2$SO$_4$ are strong acid, but HCL completely ionises while H$_2$SO$_4$ nearly completely ionises, it pH will be slightly higher, but less than the pH of Acetic acid as it is a weak acid
pH of H$_2$SO$_4$ is $1 < pH < 3.4$

(c) Explain why the acetic acid solution has a higher pH than the hydrochloric acid   **2**
solution.

The acetic acid solution has a higher pH than the hydrochloric acid solution. As HCL is a strong acid & Acetic acid is a weak acid. This means that the HCl solution is fully ionised, where the acetic acid has only partly ionised

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