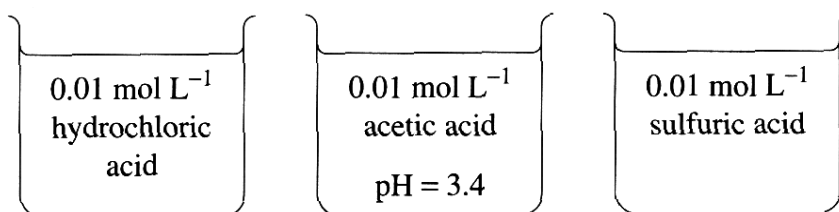# Chemistry

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. **1**

$$pH = -\log_{10}(H^+) = -\log_{10}[0.01] = 2$$

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

the pH's are the ~~same~~ the same $(pH = 2)$. This is because they are both strong acids, that is they ionise completely in water. ~~But because~~ Sulfuric acid is a diprotic acid, that is it donates 2 protons for every molecule, ~~it is too~~

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

acetic acid is a weak acid so it will not completely ionise in solution. Hence it will not be as strong as HCl and will have a higher pH (lower pHs are stronger acids).

$$CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H_3O^+$$

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