2002 HIGHER SCHOOL CERTIFICATE EXAMINATION

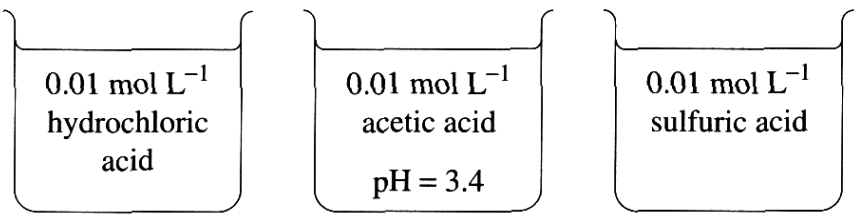
Chemistry

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.



(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.) **2**

They will be the same because they are both strong acids and will fully ionise. The sulfuric acids pH will be lower than the pH of the HCl because they will both fully ionise but Sulfuric acid is diprotic therefore it will have twice as many H^+ ions as the HCl.

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

Acetic acid is a weak acid, therefore it does not ionise fully. Hydrochloric acid is a strong acid so it will ionise fully. This means their will be more H^+ ions in the HCl solution than in the CH_3COOH solution. Therefore the pH will be lower.