2002 HIGHER SCHOOL CERTIFICATE EXAMINATION

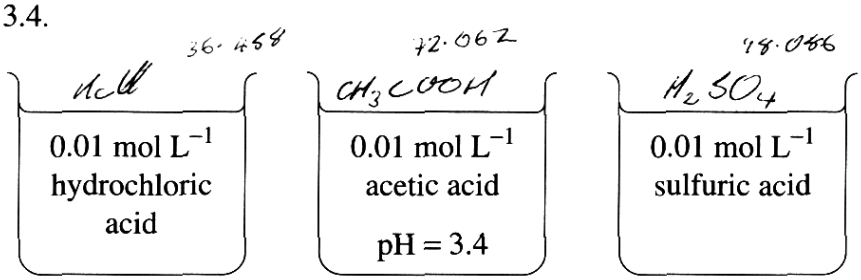
Chemistry

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.



pH = -log[H⁺]

(a) Calculate the pH of the hydrochloric acid solution. **1**

pH = 1.5

(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**

Sulfuric acid has a lower pH than the hydrochloric acid solution. This is because the sulfuric acid (H_2SO_4) has twice as many hydrogen ions which dissociate than the hydrochloric acid (HCl). They are both strong acids which completely dissociate

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

Acetic acid has a higher pH as it is a weak acid which does not completely ionisis when mixed with water, whereas Hydrochloric acid does. Therefore acetic acid has less H^+ ions than the same concentration of hydrochloric acid.