

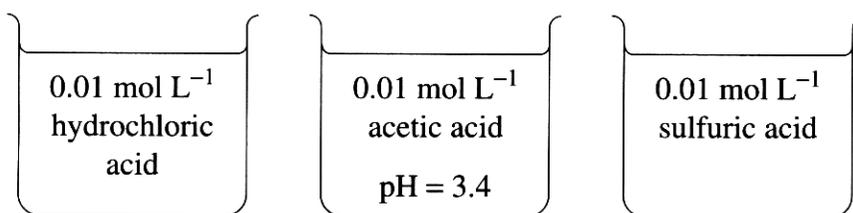
Chemistry

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 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

• Acetic acid does not go to complete ionisation in solution and is therefore a weak acid (ionisation typically 1-8%)
 • HCl goes to complete ionisation in solution (100%) and is therefore a strong acid
 • Even though the molarity of both solutions = 0.01 , HCl is a stronger acid than acetic acid \therefore producing more H^+ and \therefore it has a lower pH i.e. pH 2 compared to pH 3.4 of acetic acid 0.01 mol L^{-1}

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

• pH scale is a comparison of the concentration of H^+ in solution.
 \rightarrow The more H^+ , the lower the pH.
 • As acetic acid is a weak acid (see above), it produces less H^+ in solution during ionisation than HCl which is a strong acid. \therefore Acetic acid, producing fewer H^+ than HCl will have a higher pH.