

A level Chemistry A

H432/01 Periodic table, elements and physical chemistry

Question Set 6

1. (a) This question is about the properties and reactions of ethanoic acid, CH_3COOH . Ethanoic acid is a weak acid with an acid dissociation constant, K_a , of $1.75 \times 10^{-5} \text{ mol dm}^{-3}$ at 25°C .

A student uses a pH meter to measure the pH of a solution of CH_3COOH at 25°C .

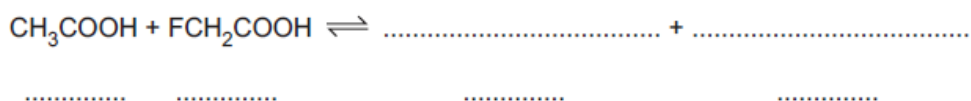
The measured pH is 2.440.

Calculate the concentration of ethanoic acid in the solution. Give your answer to **three** significant figures.

concentration = mol dm^{-3} [3]

- (b) Ethanoic acid is added to another weak acid, fluoroethanoic acid, FCH_2COOH ($K_a = 2.19 \times 10^{-3} \text{ mol dm}^{-3}$). An equilibrium is set up containing two acid-base pairs.

Complete the equilibrium and label the conjugate acid-base pairs as **A1**, **B1** and **A2**, **B2**



[2]

- (c) (i) The student plans to prepare a buffer solution that has a pH of 4.50. The buffer solution will contain ethanoic acid, CH_3COOH , and sodium ethanoate, CH_3COONa .

The student plans to add 9.08 g CH_3COONa to 250 cm^3 of $0.800 \text{ mol dm}^{-3}$ CH_3COOH . The student assumes that the volume of the solution does not change.

Show by calculation whether, or not, the student's experimental method would produce the required pH.

Show **all** your working.

[5]

- (ii) When the student prepares the buffer solution, the volume of solution increases slightly.

Suggest whether the pH of the buffer solution would be the same, greater than, or less than your calculated value in (c)(i).

Explain your reasoning.

[2]

Total Marks for Question Set 6: 12

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