

A Level Chemistry B (Salters)
H433/02 Scientific literacy in chemistry

Question Set 1

1

Sodium ethanoate is used as an 'acidity regulator' in foods.

- (a) (i) Sodium ethanoate, CH_3COONa , can be made by reacting solutions of ethanoic acid, CH_3COOH , and sodium carbonate, Na_2CO_3 , in the laboratory.

Write an equation for this reaction.

[2]

- (ii) Calculate the volume (in cm^3) of $0.500 \text{ mol dm}^{-3}$ Na_2CO_3 that would react with 25.0 cm^3 of $0.450 \text{ mol dm}^{-3}$ CH_3COOH .

volume of $\text{Na}_2\text{CO}_3 =$ cm^3

[2]

- (b) The ethanoate ion forms an alkaline solution in water.
Write an equation to show this.

[1]

- (c) (i) Ethanoic acid is a weak acid. $K_a = 1.7 \times 10^{-5} \text{ mol dm}^{-3}$.
Write an equation for the reaction of ethanoic acid in water.

[1]

- (ii) Calculate the pH of a $0.030 \text{ mol dm}^{-3}$ solution of ethanoic acid.

pH =

[2]

- (d) When sodium ethanoate is acting as an acidity regulator in food, a buffer solution is set up. This buffer involves sodium ethanoate and ethanoic acid.

Explain, with the help of an appropriate equation, how this buffer solution works when acid is added.

[3]

- (e) (i) Some students investigate buffers involving sodium ethanoate and ethanoic acid.

They make a solution containing equal amounts of ethanoic acid and sodium ethanoate.

Calculate the pH of this solution.

$K_a = 1.7 \times 10^{-5} \text{ mol dm}^{-3}$ for ethanoic acid.

pH =

[1]

- (ii) The students then set out to make a buffer solution of a known pH. They have 25.0 cm^3 of a 0.100 mol dm^{-3} solution of ethanoic acid.

Calculate the mass of sodium ethanoate they need to add to the acid solution to make a solution of $\text{pH} = 5.00$.

mass of sodium ethanoate = _____ g [4]

Total Marks for Question Set 1: 16

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