



STARTER FOR 10!!!

3.5. Buffer solutions

A buffer solution is a solution that resists a change in pH when a small quantity of acid or base is added.

1. (a) A buffer solution is made by mixing 0.510 mol of methanoic acid with 0.450 mol of sodium methanoate in 500 cm³ of water.

(i) Write an equation to represent the equilibrium established in the buffer solution.

.....(1 mark)

(ii) Calculate the pH of the buffer solution formed. (pK_a for methanoic acid = 3.75)

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.....(3 marks)

(b) Explain how this buffer resists change in pH on;

(i) addition of a small quantity of acid.

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.....(1 mark)

(ii) addition of a small quantity of base.

.....
.....(1 mark)

2. Mark and Karen are carrying out a science project on the application of buffer solutions in the human body. They have discovered that a buffer of carbonic acid (H₂CO₃) and hydrogen carbonate (HCO₃⁻) is present in blood plasma to maintain a pH of between 7.35 and 7.45.

(a) They would like to recreate a similar buffer solution in the laboratory. In what proportions should they mix 0.150 mol dm⁻³ solutions of carbonic acid and sodium hydrogen carbonate to give a buffer solution with a pH of 7.40? (K_a for H₂CO₃ is 4.5×10^{-7} mol dm⁻³).

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.....(2 marks)

(b) Why do you think buffer solutions are needed in the human body?

.....(2 marks)