

Chemguide – questions

BUFFER SOLUTIONS

- What is a buffer solution?
 - Give an example of a buffer solution with a pH less than 7.
 - Give an example of a buffer solution with a pH greater than 7.
- This question is about a buffer solution made by mixing together solutions containing ethanoic acid and sodium ethanoate.

 - If you add a small amount of an acid such as dilute hydrochloric acid to this, the pH doesn't change much. Explain what happens to the extra hydrogen ions you have added.
 - If you add a small amount of an alkali such as sodium hydroxide solution to the buffer solution, again the pH doesn't change much. There are two ways in which the extra hydroxide ions can be removed. What are they?
- This question is about a buffer solution made by mixing together solutions containing ammonia and ammonium chloride.

 - If you add a small amount of an acid such as dilute hydrochloric acid to this, the pH doesn't change much. There are two ways in which the extra hydrogen ions can be removed. What are they?
 - If you add a small amount of an alkali such as sodium hydroxide solution to the buffer solution, again the pH doesn't change much. Explain what happens to the extra hydroxide ions you have added.
- In all these questions, K_a for ethanoic acid = $1.74 \times 10^{-5} \text{ mol dm}^{-3}$.

 - Calculate the pH of a buffer solution containing $0.100 \text{ mol dm}^{-3}$ ethanoic acid and $0.100 \text{ mol dm}^{-3}$ sodium ethanoate.
 - Calculate the pH of a buffer solution containing $0.500 \text{ mol dm}^{-3}$ ethanoic acid and $0.250 \text{ mol dm}^{-3}$ sodium ethanoate.
 - In what proportions would you have to mix solutions of ethanoic acid and sodium ethanoate of the same concentration in order to produce a buffer solution of pH 5.00?

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5. In all these questions, K_a for the ammonium ion, NH_4^+ , is $5.62 \times 10^{-10} \text{ mol dm}^{-3}$.
- a) Calculate the pH of a buffer solution containing $0.200 \text{ mol dm}^{-3}$ ammonia and $0.200 \text{ mol dm}^{-3}$ ammonium chloride.
- b) Calculate the pH of a buffer solution containing $0.100 \text{ mol dm}^{-3}$ ammonia and $0.200 \text{ mol dm}^{-3}$ ammonium chloride.
- c) In what proportions would you have to mix solutions of ammonia and ammonium chloride of the same concentration in order to produce a buffer solution of pH 10.00?