

## Practical 1 – Chapter 8

### Buffer solutions

The aim of this experiment is to prepare some buffer solutions and to test their buffering action.

In the first set of experiments you will investigate the effect of changing the relative amounts of the two components of the buffer on its buffering ability. In the second set of experiments you will investigate how diluting the buffer affects its buffering capacity.

#### Safety

- 1.0 mol dm<sup>-3</sup> NaOH is corrosive.
- 0.10 mol dm<sup>-3</sup> NaOH is an irritant.
- Wear eye protection.

#### Investigation 1

1 Make up the following mixtures:

Buffer	Volume of 1.0 mol dm <sup>-3</sup> CH <sub>3</sub> COOH(aq)	Volume of 1.0 mol dm <sup>-3</sup> CH <sub>3</sub> COONa(aq)	Total volume
A	100 cm <sup>3</sup>		100 cm <sup>3</sup>
B	80 cm <sup>3</sup>	20 cm <sup>3</sup>	100 cm <sup>3</sup>
C	60 cm <sup>3</sup>	40 cm <sup>3</sup>	100 cm <sup>3</sup>
D	50 cm <sup>3</sup>	50 cm <sup>3</sup>	100 cm <sup>3</sup>
E	40 cm <sup>3</sup>	60 cm <sup>3</sup>	100 cm <sup>3</sup>
F	20 cm <sup>3</sup>	80 cm <sup>3</sup>	100 cm <sup>3</sup>
G	0	100 cm <sup>3</sup>	100 cm <sup>3</sup>
H	100 cm <sup>3</sup> of H <sub>2</sub> O		100 cm <sup>3</sup>

2 Measure the pH of each solution.

3 Divide each buffer solution into two. Investigate the effect on the pH of adding 5 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> HCl(aq) or 5 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> NaOH(aq) (**Care!**) to each buffer solution.

#### Investigation 2

1 Make up 200 cm<sup>3</sup> of buffer solution by mixing 100 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> ethanoic acid with 100 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> sodium ethanoate. Label this **J**.

2 Measure the pH of solution J.

3 Take two 50 cm<sup>3</sup> portions of solution J and investigate how the pH changes when 5 cm<sup>3</sup> of 0.10 mol dm<sup>-3</sup> HCl(aq) or 5 cm<sup>3</sup> of 0.10 mol dm<sup>-3</sup> NaOH(aq) (**Care!**) are added.

4 Take the remaining 100 cm<sup>3</sup> of solution J and add 100 cm<sup>3</sup> of water. Label this **K**.

5 Measure the pH of solution K.

6 Take two 50 cm<sup>3</sup> portions of solution K and investigate how the pH changes when 5 cm<sup>3</sup> of 0.10 mol dm<sup>-3</sup> HCl(aq) or 5 cm<sup>3</sup> of 0.10 mol dm<sup>-3</sup> NaOH(aq) (**Care!**) are added.

7 Keep repeating the procedure by diluting each successive buffer solution until you have sufficient data.