

## Determining the $pK_a$ of aspirin

### Teacher and technician sheet

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#### Health and safety note

Make sure that students wear eye protection and that there are no naked flames.  $0.1 \text{ mol dm}^{-3}$  sodium hydroxide is an irritant. 95% ethanol is highly flammable. 2-hydroxybenzoic acid and 95% ethanol are both harmful.

#### Equipment and materials

Each student or pair of students will require:

- Access to a balance (2 or 3 d.p.)
- $50 \text{ cm}^3$  burette
- $250 \text{ cm}^3$  beaker
- $10 \text{ cm}^3$  and  $100 \text{ cm}^3$  measuring cylinders
- Glass stirring rod
- Spatula
- pH probe and pH meter
- Aspirin – Harmful
- 95% ethanol – Highly flammable, Harmful
- $0.10 \text{ mol dm}^{-3}$  sodium hydroxide solution – Irritant

#### Calibration of pH probe

The pH probe (electrode) should be calibrated using two standard buffer solutions. Most pH probes and meters contain instructions for calibration and use.

#### Values

For aspirin:

$$pK_a = 4.57$$

$$K_a = 2.72 \times 10^{-5} \text{ mol dm}^{-3}$$