

## Determining the $pK_a$ 's of glycine

### Teacher and technician sheet

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#### Health and safety note

Make sure that students wear eye protection.  $0.10 \text{ mol dm}^{-3}$  sodium hydroxide solution and  $0.1 \text{ mol dm}^{-3}$  nitric acid are irritant.

#### 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
- Glass stirring rod
- $100 \text{ cm}^3$  measuring cylinder
- $10 \text{ cm}^3$  pipette and pipette filler
- Spatula
- pH probe and pH meter
- Glycine
- $0.10 \text{ mol dm}^{-3}$  sodium hydroxide solution – Irritant
- $0.05 \text{ mol dm}^{-3}$  potassium nitrate(V) solution (prepared by dissolving 0.5 g of solid (Oxidising) in  $100 \text{ cm}^3$  of deionised water)
- $0.1 \text{ mol dm}^{-3}$  nitric acid – 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

pH at which zwitterions exists = 6.06

$$pK_{a1} = 2.35$$

$$K_{a1} = 4.47 \times 10^{-3} \text{ mol dm}^{-3}$$

$$pK_{a2} = 9.78$$

$$K_{a2} = 1.66 \times 10^{-10} \text{ mol dm}^{-3}$$