A 50.0 mL solution contained 10.00 g of NaOH in water at 25.00 °C. When it was added to a 250.0 mL solution of 0.200 M HCl at 25.00 °C in a “coffee cup” calorimeter, the temperature of the solution rose to 33.95 °C. Assuming the specific heat of the solution is 4.18 J K\(^{-1}\) g\(^{-1}\), that the calorimeter absorbs a negligible amount of heat, and that the density of the solution is 1.00 g mL\(^{-1}\), calculate \(\Delta H_r\) (in kJ mol\(^{-1}\)) for the following reaction. \[\text{H}^+(\text{aq}) + \text{OH}^-\text{(aq)} \rightarrow \text{H}_2\text{O}(l)\]

When the experiment was repeated using 12.00 g of NaOH in water, the temperature increase was the same. Explain.
Water solutions of NaOH (100 mL, 2.0 M) and HCl (100 mL, 2.0 M), both at 24.6 °C, were mixed together in a coffee cup calorimeter. The temperature of the solution rose to 38.0 °C during the reaction process. Write a balanced chemical equation to describe the reaction in the calorimeter.

Is the process an endothermic or exothermic reaction?

Assuming a perfect calorimeter, determine the standard enthalpy change for the neutralisation reaction. Assume the density of water is 1.00 g mL⁻¹. The heat capacity of water is 4.18 J K⁻¹ g⁻¹.
A 0.50 g sample of ammonium nitrate, NH₄NO₃(s), was dissolved in 35.0 g of water in a coffee cup calorimeter. The temperature of the solution dropped from 22.7 to 21.6 °C. Write a balanced equation to describe the reaction in the calorimeter.

Describe this process as either endothermic or exothermic.

Assuming a perfect calorimeter what is the heat of solution of ammonium nitrate, expressed in kJ mol⁻¹? Assume the density of the solution is 1.00 g mL⁻¹ and that the heat capacity of the solution is 4.18 J K⁻¹ g⁻¹.

Heat radiating fins are used to dissipate heat and prevent damage to electronic components. Is it better to make the fins out of aluminium or iron? Give reasons for your answer.

Data: Specific heat of Al = 0.900 J K⁻¹ g⁻¹  Specific heat of Fe = 0.444 J K⁻¹ g⁻¹