

CHEMISTRY
Investigative Skills Assignment
Task Sheet

CHM3T/Q09/Task

The investigation of an unknown acid

A storage tank at a derelict chemical works was found to contain an unknown monoprotic acid. The determination of the enthalpy of neutralisation of the unknown acid is a first step in its identification.

You are provided with a 1.00 mol dm^{-3} solution of the unknown acid, and a 1.00 mol dm^{-3} solution of sodium hydroxide. Determine the temperature rise for the neutralisation of a sample of the unknown acid by sodium hydroxide.

Wear eye protection at all times.

Assume that all solutions are toxic and corrosive.

Implementing

- 1 Rinse a burette with the unknown acid provided. Set up the burette and, using a funnel, fill it with the unknown acid provided.
- 2 Using the burette, transfer 25.0 cm^3 of the unknown acid to a clean, dry plastic cup.
- 3 Measure the temperature of the unknown acid in the cup. Record your result to **one** decimal place in the box provided on the Candidate Results Sheet.
- 4 Wash the thermometer with distilled or de-ionised water and dry the thermometer.
- 5 Using a pipette filler, rinse a pipette with the sodium hydroxide solution provided. Using this pipette, transfer 25.0 cm^3 of this sodium hydroxide solution to a second clean, dry plastic cup.
- 6 Place the plastic cup containing the sodium hydroxide solution in a beaker to provide support and additional insulation. Mount the thermometer in the cup using a clamp and stand. The bulb of the thermometer must be fully immersed in the solution. Place a stirrer in the cup.
- 7 Stir the sodium hydroxide solution in the cup, start the clock, then measure the temperature to **one** decimal place. Record the temperature reading in a table of your own design on the Candidate Results Sheet. Every minute for a further three minutes stir the solution, measure the temperature and record each result in your table.
- 8 At the fourth minute add the 25.0 cm^3 of the unknown acid from the **other** plastic cup. Stir the mixture but do not record the temperature.
- 9 Continue to stir the mixture, measure the temperature at the fifth minute, and then at every subsequent minute up to the tenth minute. Record each temperature in your table.

ISA CHM3/Q09 Candidate Results SheetCentre Number

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Candidate number

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Candidate Name

Results

Present your results in an appropriate form in the space below.

Temperature of the unknown acid/ $^{\circ}\text{C}$	
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For Teacher's use only			
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