***Reaction rates*** Planning ahead and equipment list

## Teacher demonstration

* rusted nail
* 2 cm magnesium ribbon
* Bunsen burner
* matches
* metal tongs
* heat proof tile
* Personal Protective Equipment

## Investigation 1: Surface area and reaction rate

Equipment needed per group:

* 2 x 3x3x3 cm cubes of gelatine with phenolphthalein
* knife
* cutting board
* 2 x 500 mL beaker
* 250 mL 1 M NaOH
* stopwatch
* plastic ruler
* 100 mL measuring cylinder
* spatulas/plastic spoons
* paper towel
* Personal Protective Equipment

Gelatine and Phenolphthalein preparation (prior to use)

Gelatine is tasteless and comes in powdered form or in transparent leaves. Follow the instructions to dissolve the gelatine (usually placing in cold distilled water then transferring to warm distilled water or gently heating). Consider using less than the recommended amount of water to ensure that the jelly sets firmly.

Add 10mL of 1% phenolphthalein to the dissolved gelatine solution (1000mL) and stir. Note: If the mixture is pink, add a few drops of 0.1M hydrochloric acid until the pink colour disappears.

Pour the gelatine solution into a tray deep enough to allow 3x3x3 cm cubes to form. Refrigerate overnight. The 3x3x3 cm cubes should be prepared so that each student group gets 2 cubes.

## Investigation 2: Concentration and reaction rate

Equipment needed per group:

* 3 x 1 cm magnesium ribbon
* steel wool
* 0.1 M HCl (10 mL)
* 1.0 M HCl (10 mL)
* 2.0 M HCl (10 mL)
* 3 x test tube
* test tube rack
* 10 mL measuring cylinder
* stopwatch
* Personal Protective Equipment

## Investigation 3: Temperature and reaction rate

Equipment needed per group:

* 0.1 M sodium thiosulfate (hypo) (200 mL)
* 2.0 M HCl (40 mL)
* 3 x 250 mL conical flask
* 2 x 500 mL beaker
* test tube
* ice
* hot water
* thermometer
* white paper
* pencil
* 50 mL measuring cylinder
* 10 mL measuring cylinder
* stopwatch
* paper towels
* Personal Protective Equipment

## Investigation 4: Catalysts and reaction rate

Equipment needed per group:

* 3.0% H2O2 hydrogen peroxide solution (50 mL)
* 5 g manganese dioxide
* spatula
* 5 mL detergent
* 1 mL transfer pipette/dropper
* 2 x test tube
* test tube rack
* 10 mL measuring cylinder
* 250 mL beaker
* warm water
* thermometer

## Investigation 5: Challenge – You are the process chemist

Equipment needed per group:

* 1.0 M HCl (40 mL)
* 0.1 M HCl (40 mL)
* 2.0 M HCl (40 mL)
* calcium carbonate (powder ≤1 mm diameter)
* calcium carbonate (‘sand’ 1–3 mm diameter). This can be purchased or generated by using a mortar and pestle
* calcium carbonate (chips 4–10 mm)
* test tube rack
* 5 x test tube
* 250ml beaker (for hot or cold water)
* 5 mL measuring cylinder (for liquid reactants)
* stopwatch
* electronic mass balance (± 0.01 g if possible)
* watch glass (for weighing calcium carbonate on the scale)
* thermometer
* hot water
* ice
* Personal Protective Equipment
* student investigation sheet