

# GCSE Double Award Science Biology

## Teacher / Technician Notes

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Please note that it is the responsibility of the centre to ensure that all risk assessments for practical work are carried out and that all appropriate hazard labels are used for the chemicals listed.



## Double Award Science Biology Teacher / Technician Notes

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## B1 Investigate the need for light and chlorophyll in photosynthesis by testing plant leaves for starch

### Investigation 1a

#### Safety

Wear safety glasses.

Take care when using iodine.

Take care when using ethanol.

Take care when using hot water.

#### Apparatus and Materials

##### **Prior to investigation**

Preparing a destarched geranium plant.

This is carried out by placing the plant in a dark cupboard for 48 hours. The plant is then removed from the cupboard, and a dark strip placed over part of one of its leaves before being placed in bright light for 24 hours prior to the day of the investigation.

##### **Day of investigation**

- The geranium plant that has a dark strip of card placed over one of its leaves (that had been destarched and then placed in bright light for 24 hours)
- Heatproof mat
- 250 cm<sup>3</sup> beaker
- Hot water
- Boiling tube rack
- Boiling tube containing 15cm<sup>3</sup> of ethanol
- Petri dish/white tile
- Iodine solution
- Forceps/glass rod
- Safety glasses

## Investigation 1b

### Safety

Wear safety glasses.

Take care when using iodine.

Take care when using ethanol.

Take care when using hot water.

### Apparatus and Materials

#### **Prior to investigation**

Preparing a destarched variegated plant (Geranium).

This is carried out by placing the variegated plant in a dark cupboard for 48 hours. The plant is then removed from the cupboard before being placed in bright light for 24 hours prior to the day of the investigation.

#### **Day of the investigation**

- The variegated geranium plant (that has been destarched and then placed in bright light for 24 hours)
- Heatproof mat
- 250 cm<sup>3</sup> beaker
- Hot water
- Boiling tube rack
- Boiling tube containing 15cm<sup>3</sup> of ethanol
- Petri dish/white tile
- Iodine solution
- Forceps/glass rod
- Safety glasses

## B2 Investigate the energy content of food by burning food samples

### Safety

Wear safety glasses.

Take care when clamping the boiling tube.

Take care when with using the Bunsen burner.

Take care with hot boiling tube.

Take care with retort stand.

### Apparatus and Materials

Each student will require:

- Retort stand
- Clamp with boss head
- Bunsen burner
- Boiling tube
- Mounted needle/wire mesh/dish
- Heatproof mat
- Tripod and gauze (if using wire mesh dish for burning food)
- Tongs for lighting food in Bunsen burner (if using wire mesh dish to burn food in)
- Thermometer
- Stirring rod
- 25 cm<sup>3</sup> measuring cylinder
- Bunsen burner lighter/wooden splint
- Cracker (e.g. mini cheddars/mini ritz)
- Safety glasses
- Balance set to measure mass in grams to one decimal place
- Calculator

## B3 Investigate the effect of temperature on the action of an enzyme

### Safety

Beakers containing Hydrogen Peroxide should be appropriately labelled as per the CLEAPSS hazard.

Take care with hot water baths/hot water.

Pupils are to wear safety glasses throughout.

### Apparatus and Materials

#### Preparation of enzyme extract

- Food processor
- Potatoes
- Muslin/cheesecloth
- (Distilled) Water ( $350\text{ cm}^3$ ) (for making potato extract containing catalase)

#### Apparatus and materials for candidates

- Water baths x 2 (Set at  $20^\circ\text{C}$  and  $30^\circ\text{C}$ )
- Boiling tube racks to hold boiling tubes in each water bath
- 2 x thermometers, 1 for each water bath
- 1 x small beaker containing  $20\text{ cm}^3$  of Hydrogen peroxide (10% vol)
- 1 x small beaker with  $10\text{ cm}^3$  of catalase from potato extract
- 1 x waterproof marker pen
- 1 x ruler
- 1 x timer
- 1 x  $5\text{ cm}^3$  syringe
- 1 x  $10\text{ cm}^3$  syringe
- 1 x boiling tube rack, on the bench containing 4 boiling tubes labelled 1 to 4 with a waterproof marker
- Safety glasses

#### Preparation of enzyme extract

- Cut up one peeled medium sized potato and use the food processor to blend it with  $350\text{ cm}^3$  of (distilled) water
- Strain the processed potato through cheese cloth/muslin
- Collect the fluid in a beaker (this produces approximately  $200\text{ cm}^3$  of extract)  
(1 student would use  $10\text{ cm}^3$ )  
(extraction must be no more than 24 hours before use and must be kept in the fridge until usage)

- Set up 2 water baths, one at 20°C, the other at 30°C, each containing a boiling tube rack to hold 1 boiling tube. Ensure racks do not float in the water baths
- Prepare 1 small labelled beaker with 20 cm<sup>3</sup> of Hydrogen peroxide
- Prepare 1 small labelled beaker with 10 cm<sup>3</sup> of catalase in each
- Prepare 1 boiling tube rack, with 4 boiling tubes, labelled 1 to 4

**Alternative apparatus**

If suitable water baths are not available, the following apparatus may be used.

Beakers containing preheated water at the two temperatures can be used to hold and heat the boiling tubes. In this case 2 thermometers will be needed, one for each beaker.



## **B4 Use quadrats to investigate the abundance of plants and/or animals in a habitat**

### **Safety**

Carry out a risk assessment prior to visiting the habitat.

Take care when in the habitat.

### **Apparatus and Materials**

- Transect line/long tape measure
- Quadrat
- Meter stick
- Light meter or probe
- pH probe
- Soil moisture probe

## B5a Investigate the process of osmosis by measuring the change in length or mass of plant tissue

### Safety

Wear safety glasses.

Take care when with using the cork borer and the knife.

### Apparatus and Materials

- 0.0M sucrose solution (water)
- 0.2M sucrose solution
- 0.4M sucrose solution
- 0.6M sucrose solution
- 0.8M sucrose solution
- Large white potatoes (to cut potato cylinders to a length of 40mm)
- Knife
- Cork borer (recommended minimum diameter 14mm)
- 250 cm<sup>3</sup> beakers (5)
- Measuring cylinder to measure 100cm<sup>3</sup> of sucrose solutions
- Ruler with mm scale
- Labels or marker
- White tile/board (for cutting potato)
- Paper towels
- Balances
- Calculator
- Safety glasses

## B5b Investigate the process of osmosis in a model cell using Visking tubing

### Safety

Normal laboratory safety procedures.

### Apparatus and Materials

- 3 lengths of Visking tubing each 30cm long in a beaker of water
- 20cm<sup>3</sup> of water (0% sucrose solution) in a small, labelled beaker
- 100cm<sup>3</sup> of 5% sucrose solution in a small, labelled beaker
- 20cm<sup>3</sup> of 20% sucrose solution in a small, labelled beaker
- 5cm<sup>3</sup> syringe
- Marker pen/labels
- Balance
- 3 x boiling tubes labelled 1, 2, and 3
- Paper towels

## **B6a Use the washing line method to investigate the factors affecting the rate of water loss from leaves**

### **Safety**

Take care with retort stands.

### **Apparatus and Materials**

- String for washing line
- Retort stands for washing line
- Leaves of different surface area (sizes) – small, medium and large from one species of plant (one of each size)
- Balance (set to measure to at least one decimal place)
- Paperclips

Geranium and laurel leaves work well.

## **B6b Use a bubble potometer to investigate the factors affecting the rate of water uptake by a plant**

### **Safety**

Take care with retort stands.

### **Apparatus and Materials**

- Clamp with boss head
- Retort stand
- Potometer
- Small beaker with water
- Fan
- Timer/clock
- 10cm<sup>3</sup> syringe
- Basin/sink
- Ruler
- Calculator
- Marker pen
- 1 plant shoot

Freshly cut Laurel shoots work well when kept in water.

## **B6c Use a weight potometer to investigate the factors affecting the rate of water uptake by a plant**

### **Safety**

Normal laboratory safety.

### **Apparatus and Materials**

- 2 identical plant shoots
- 2 x 250 cm<sup>3</sup> conical flasks
- 2 bungs each with one hole (to fit in the conical flasks)
- 250cm<sup>3</sup> cylinder
- 500cm<sup>3</sup> water in a beaker
- Timer/clock
- 2 x Balances
- Vaseline
- Calculator

