



General Certificate of Education  
Advanced Subsidiary Examination  
June 2011

**Biology**

**BIO3T/P11/TN**

**Unit 3T AS Investigative Skills Assignment**

**Teachers' Notes**

**Confidential**

**A copy should be given immediately to the teacher(s) responsible for  
GCE Biology**

## Teachers' Notes

### CONFIDENTIAL

These notes must be read in conjunction with *Instructions for the Administration of the Investigative Skills Assignment: for GCE Biology* published on the AQA website.

#### Investigating the effect of different enzymes in apple juice production

In commercial fruit juice production enzymes are used to increase the yield of juice.

Two of the enzymes used are pectinase and cellulase.

These enzymes break down the cell walls to release more juice.

Candidates will investigate which enzyme is more effective in releasing juice from apple pulp.

#### Materials

In addition to access to general laboratory equipment, each candidate needs

- 100 g of apple pulp
- 5 cm<sup>3</sup> of pectinase
- 5 cm<sup>3</sup> of cellulase
- two pipettes or syringes to measure 2 cm<sup>3</sup>
- two 100 cm<sup>3</sup> beakers
- timer or stop clock
- thermometer to measure 0°C to 100°C
- filter funnel
- filter papers
- measuring cylinder to measure volumes up to 25 cm<sup>3</sup>
- glass rod
- access to a balance
- spoon or spatula to transfer apple pulp

#### Managing the investigation

Apple pulp may be bought as a purée or made by liquidising peeled and cored apple pieces. A ratio of 200 g of apple to 50 cm<sup>3</sup> of distilled water should be used in the liquidiser. Most varieties of apple will produce measureable quantities of juice. It is recommended that Golden Delicious is **not** used.

Sources of pectinase vary considerably in concentration. You should adjust the concentration of enzyme used so that between 10 and 30 cm<sup>3</sup> of juice is produced in 30 minutes when pectinase is used.

Both enzymes should be used on the same batch of apples in the investigation. Both experiments can be run at the same time if candidates can be supplied with additional apparatus.

## Technical Information

This was trialled successfully using 20% Pectinex and 20% Celluclast from NCBE and also using 0.2% pectinase and 0.2% cellulase from Philip Harris. Both Royal Gala and Bramley apples have been successfully used.

### The task must be trialled before use.

Candidates **must not** be given information about an ISA assessment until one week before Stage 1. One week before the task, teachers may give their candidates the following information.

You will investigate the role of enzymes in fruit juice production.

In addition you will also need to understand the following topics

- life style and diseases
- risk factors associated with coronary heart disease
- immunology

There **must** be no further discussion of this topic and candidates **must not** be provided with any further resources to prepare for the assessment.

### In this investigation, teachers must not give candidates the following information

- How to find out if temperature changes during the investigation could have influenced the data collected.