



NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – OCTOBER 2016

LIFE SCIENCES SUPPLEMENTARY PAPER III

MARKING GUIDELINES

Time: 1½ hours

50 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

Invigilators are asked to please complete this after the examination.

CRITERIA		
Following instructions	0	1
Test tube contents	0	1
Manipulation	0	1
TOTAL		3

(3)

11. Draw up a suitable table in the space below and record your observations. In the table you will need to describe the appearance of the contents and the degree of gelatinisation once the test tubes have been removed from the ice.

Table Heading: mention the (appearance of contents and the degree of gelatinisation) in (three test tubes/test tubes A, B and C).

Table layout: column for the three test tubes and a description of each test tube needs to be in the table.

In the descriptions there needs to be evidence around degree of gelatinisation (i.e. runny, less runny, not runny/solid) for example AND appearance of contents – some reference to colouration or clear vs cloudy for example.

(6)

12. Write a conclusion for this investigation based on your observations.

The test tube containing gelatine solution with fresh pineapple in, where there is active bromelain present, the jelly does not set or vice versa. NOTE: the conclusion given needs to correlate with the candidate's OWN findings as has been recorded in their table.

(2)

13. What is the independent variable for this investigation?

Presence or absence of bromelain/pineapple with or without enzyme.

(2)

14. What is the dependent variable for this investigation?

Setting of the solution.

(2)

15. Discuss TWO precautions that are very necessary to follow when setting up this investigation to ensure the outcome is valid. In your discussion of the precautions give the reasons why the investigator needs to be cautious.

Cut the tinned pineapple first/avoid contamination (with bromelain) of the tinned pineapple by making certain that the knife is cleaned off well between cutting and working with the pineapple./Use a separate spoon for the two types of pineapple.

Stir the gelatine solutions with a separate/clean kebab stick. Make sure size of pieces in both are the same.

(4)

16. If the stock gelatine solution prepared in Step 4 above is regarded as a 100% gelatine solution, complete the table below and describe what you would do to prepare a 50% and a 25% gelatine solution.

% Concentration	Preparation
100	Described in the method given above. (Step 4)
50	Take 50 ml (100% solution gelatine solution) and add 50 ml of water to it. OR 7,5 ml of gelatine powder added to 100 ml of water.
25	Take 50 ml (50% solution gelatine solution) and add 50 ml of water to it. OR 3,75 ml of gelatine powder added to 100 ml of water.

(4)

17. Identify TWO safety precautions that are needed to be followed when carrying out this investigation.

Handle boiling water carefully.

Be careful when cutting the pineapple with the sharp knife.

(2)

18. How could the reliability of this investigation be tested?

Repeat the investigation.

(1)

19. What is the role of test tube C?

Control use it to compare the results of the investigation against.

(2)

20. List any TWO controlled/fixed variables and state precisely how they will be controlled to ensure fair testing.

- **Same amount of pineapple added to each test tube – measure off 5 ml by levelling pineapple on a 5 ml measuring spoon.**
- **Same amount (20 ml) of gelatine solution in each test tube – using a syringe, place 20 ml into each of the three test tubes.**
- **Same time in ice water to set – leave all three test tubes in ice for 20 minutes.**
- **Gelatine used needs to be the same – take from the same packet.**

Consider any reasonable discussion. Do not accept "set up in same place/environment" because they are as per the nature of this investigation.

(2 × 2)

21. Ask the invigilator for a fresh piece of pineapple. Make a biological drawing of the piece of pineapple in the space below. You do not need to label any of the parts of your drawing. Make sure that your drawing is larger than the piece of pineapple in order to show some of the detail* in your item. Give your drawing a suitable heading and give some indication of scale or magnification.

*Detail you see with your naked eye.

- **Heading of the diagram, e.g. biological diagram of a piece of fresh pineapple.**
 - **Size drawn bigger than the piece (marking this could be tricky if not able to see size given) BUT told to draw bigger so the magnification given needs to be on diagram and needs to be greater than 1x.**
 - **All drawing lines clear and solid, not sketchy or untidy.**
 - **No shading must be evident.**
 - **Must be more than just an outline, some evidence to show nature of the "flesh" of a pineapple piece.**
- (5)

PART 2 EXPERIMENTAL DESIGN

Using equipment that you would find in a school laboratory, design an experiment in which you determine the length of time required to destroy (denature) the enzyme bromelain using heat. You must use a stock gelatine solution such as the one prepared in the investigation you carried out in Part 1 – Step 4.

- 1.1 Formulate a hypothesis for this experiment that you are designing.

E.g. Pineapple boiled for more than 10 minutes or more when added to a gelatine solution will allow the gelatine to set.

Bromelain in pineapple is destroyed after 10 minutes in boiling water.

Statement

In the hypothesis there needs to be a mention of time and of the enzyme bromelain.

(3)

- 1.2 State the aim of the experiment.

To investigate the time needed to destroy/denature bromelain that is present in pineapple.

(2)

- 1.3 Outline your own method using numbered points.

Use the IEB rubric

Layout – 1 mark

Aim – evidence of time in bromelain is boiling water and evidence of how level of denaturing can be measured – so does gelatine set, or not?

1. **Set up 5 test tubes labelled A to E.**
2. **Grind 60 ml of fresh pineapple in a mortar and pestle.**
3. **Add the ground pineapple to a heatproof beaker.**
4. **Place the beaker in a water bath of boiling water and stir the pineapple continuously over a hot plate.**
5. **After 3 minutes remove 5 ml of pineapple and add to test tube A.**
6. **Continue for 15 minutes and every 3 minutes remove 5 ml of pineapple and add to a new marked test tube, B through to E.**

- 7. When all test tubes have pineapple in, add 20 ml of a 100% gelatine solution to each test tube.**
- 8. Using a clean kebab stick, for each test tube, stir the mixture in each tube.**
- 9. Place all test tubes in a refrigerator for 30 minutes and then remove and record the setting of the gelatine in a table.**
- 10. In the first test tube from A to E where the gelatine solution sets we are able to determine the approximate time (minimum) needed to denature the bromelain in the pineapple.**
- 11. Repeat the investigation to check for the reliability of your results.**

(8)

Use the attached rubric for assessment for Question 1.3.

Method Rubric Criteria	5	4	3	2	1	0
L Layout – appearance of method					Layout meets criteria below: neat and tidy and bulleted/numbered.	Layout is untidy and hard to read. OR Method is not formatted correctly with bullet points or numbers.
A Aim – Method relates to prescribed experiment.				Method clearly tests an aim that relates to the prescribed experiment and achieves the required result.	Method relates to the prescribed aim given, but is a little confusing and does not achieve the required result.	Method does not relate to the prescribed aim or achieve the desired result. Method given is the same as the given experiment.
M Method – This needs to be appropriate and relevant to the aim, clearly logical and sequential. If apparatus is given in the examination paper, the method should resemble the one given in the marking guidelines.	All 5 criteria given below are met: 1. An original experiment provided. 2. Equipment is appropriate and used correctly. 3. Measuring of solutions, reagents and marking of equipment are explained and this assists in the control of variables. 4. Instructions are scientifically valid and ordered. 5. Instructions are complete to produce measurable results that are recorded.	An original experiment provided. Plus 3 of 5 criteria are met.	An original experiment provided. Plus 2 of 5 criteria are met.	An original experiment provided. Plus 1 of 5 criteria is met.	An original experiment provided.	None of the 5 criteria are met. OR Method a copy of the original, given experiment.

(8)