



# T Level Technical Qualification in Science

Employer-set project (ESP)

## Food Sciences

Project brief

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## Project brief

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# Guidance for students

## Student instructions

- read the project brief and the task guidance carefully before starting your work
- you **must** work independently and make your own decisions on how to approach the tasks within the employer-set project. Ideally your work should:
  - be in an Arial font 12pt, within standard border sizes, however you may choose to hand write your work. If you choose to hand write your work, this should be in black ink
  - clearly show where sources have been used to support your own ideas and opinions
  - clearly reference all sources used to support your own ideas and opinions
  - reference any quotations from websites
  - you **must** clearly name and date all of the work that you produce during each supervised session
  - you **must** hand over all of your work to your tutor at the end of each supervised session
  - you must not work on the assessment in between supervised sessions

## Student information

- this employer-set project will assess your knowledge, understanding and skills from across the core content of the qualification
- in order to achieve a grade for the core component, you **must** attempt both of the external examinations and the employer-set project – the combined marks from these assessments will be aggregated to form the overall core component grade (A\* to E and U) – if you do not attempt one of the assessments, or fail to reach the minimum standard across all assessments, you will receive a U grade
- your tutor will explain how the assessment time is broken down per task and will confirm with you if individual tasks need to be completed across multiple sessions
- at the end of each supervised session, your tutor will collect all ESP assessment materials before you leave the room – you must not take any assessment material outside of the room (such as via a physical memory device) – you **must** not upload any work produced to any platform that will allow you to access materials outside of the supervised sessions (including email)
- you can fail to achieve marks if you do not fully meet the requirements of the task, or equally if you are not able to efficiently meet the requirements of the task

## Plagiarism

Plagiarism may result in the external assessment task being awarded a U grade. For further guidance, refer to your student handbook - plagiarism in external assessment and the maladministration and malpractice policy located at [www.qualhub.co.uk](http://www.qualhub.co.uk).

## Presentation of work

- any work not produced electronically must be agreed with your tutor, the evidence you produce should be scanned and submitted as an electronic piece of evidence
- all your work should be clearly labelled with the relevant task number and your student details and be legible (for example, front page and headers)
- electronic files should be given a clear file name for identification purposes (see tasks for any relevant naming conventions)
- all pages of your work should be numbered in the format page X of Y, where X is the page number and Y is the total number of pages
- you must complete and sign the external assessment cover sheet (EACS) and include it at the front of your assessment task evidence
- you must submit your evidence to the tutor at the end of each session

# Scenario: a possible scientific solution to the problem of food related plastic packaging waste

## Introduction

Experts believe UK supermarkets create around 800,000 tonnes of plastic every year, well over half of all annual UK household plastic waste of 1.5 million tonnes. But the exact amount is a closely guarded secret. (Source: Which?/The Guardian)

Tesco is to remove 67 million pieces of plastic from its shelves from March 2020 by ceasing the use of the plastic wraps commonplace on multibuy packs of tins. It is still only a small proportion of the 1bn pieces of plastic that the chain has pledged to remove during 2020. (Source: The Guardian)

40% of the plastic we use is single use, this means we use it once and then bin it, for example, plastic carrier bags, crisp packets. (Source: BBC Newsround)

Plastic food packaging is important for a number of reasons including protection of food from damage, helping food to last longer and making food more visually appealing for consumers. These are all important for reducing food waste. However, when plastic gets into the environment, through incorrect disposal or by degrading into microplastic, it can end up polluting soils and water courses and harming the animals and plants in them.

## A possible solution

Use of new/innovative packaging materials that are more environmentally friendly.

In 2010, we saw Asda trial reusable packaging for fabric conditioner, Sainsbury's moved from cans to Combibloc cartons for its basics range of canned tomatoes, Nestle removed plastic inserts from Easter egg packaging, Stella Artois launched a lightweight glass bottle and Waitrose used flow wrap packs for minced beef. We also saw the move to wine in pouches and PET bottles, cereal without cartons and milk in bags.

## Brief

### The employer

JG Packaging PLC is an established manufacturing company in the food industry, producing a range of plastic packaging for well-known food manufacturers and supermarkets.

### The project

JG Packaging PLC are investigating the use of new/innovative packaging materials, as one of their big supermarket customers wants to use something other than plastic wrapping on their 'eat as you go' sandwich range.

Although new/innovative packaging materials will be more environmentally friendly, JG Packaging PLC needs to be sure that they are as effective as the current plastic-based wrapping they produce: do they keep food safe; do they protect food from damage? If these new alternatives are not fit for purpose, the supermarket will not want to use them with their sandwich range.

You are part of a research team at JG Packaging PLC. The team is working together to provide evidence and recommendations to the senior management at JG Packaging PLC about which new packaging they should

produce and the reasons for producing it. The recommendations need to be based on research evidence and secondary data.

You have also been asked to plan a scientific investigation to provide primary data that will provide further evidence on whether new/innovative materials are fit for purpose. You will need to present your plans to senior management to obtain approval to carry out these investigations.

The project involves research, analysing data, planning scientific investigations, collaborative working and presenting findings.

The supermarket wants you to research the potential of using beeswax, bamboo or chitin.

### **You must complete the following steps:**

- researching
- producing a plan for investigation
- analysing and evaluating the effectiveness of the investigation
- reporting on your findings
- participating in a group discussion
- reflecting on the process

Complete the tasks below to guide you through these steps.

## Task 1: research a strategy

To provide evidence of which new packaging materials might be suitable for JG Packaging PLC to produce for the supermarket's sandwich range, you need to research the potential opportunities that exist for new packaging alternatives (beeswax, bamboo or chitin).

You will need to undertake a literature review using the provided sources.

Some of the information will be useful and will provide evidence to support your recommendations of which new packaging materials JG Packaging PLC should produce. The data will also help you to think about which scientific investigations you should plan to provide primary data that would further support your recommendations.

### What you have to do

- carry out a literature review
- justify why you have chosen specific sources and rejected others
- your justification should be based on
  - how reliable you think the source is and why?
  - how relevant you think the source is and why?
- use an academic referencing technique when citing or referencing literature

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

### Resources

- ESP brief and task 1 student guidance
- computer access
- NCFE CACHE provided food packaging database
- project diary

### Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (18 marks)

AO4: Use English, mathematics and digital skills as appropriate to the development of a scientific project (4 marks)

### Core skills

CS2: Researching

CS7: Reflective evaluation

### The evidence I have to submit for this task

A literature review, as described in what you have to do above.

## **How the evidence will be assessed**

This will be externally marked by examiners.

## **Time for completion of task 1**

3 hours plus 30 minutes for completion of reflective diary.



## Task 2: plan a project

### What you have to do

Use the sources that you selected in your literature review to complete a project plan.

The project plan must:

- produce a high-level project plan for a scientific experiment to investigate the effectiveness of the new packaging material in preventing food poisoning by pathogens
- include all appropriate risk assessments
- identify the primary data you need to collect in order to conduct the investigation
- describe how you will collect the required data

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

### Resources

- ESP brief and task 2 student guidance
- NCFE CACHE provided LIMS spreadsheet
- literature review (from task 1)
- project diary
- risk assessment template
- risk matrix

### Assessment objectives

AO1: Plan their approach to meeting a scientific project (12 marks)

AO2: Apply core knowledge and skills to the development of a scientific project (12 marks)

AO4: Use English, mathematics and digital skills as appropriate to the development of a scientific project (4 marks)

AO5: Realise a project outcome and review against the intended project aims (8 marks)

### Core skills

CS1: Project management

CS2: Researching

CS3: Working with others (risk assessment)

CS4: Creativity, innovation

CS6: Communication (written)

CS7: Reflective evaluation

### The evidence I have to submit for this task

Your project plan.

## **How the evidence will be assessed**

This will be externally marked by examiners.

## **Time allowed for completion of task 2**

3 hours plus 30 minutes for completion of reflective diary.

## Task 3: analyse data

### What you have to do

Due to the limitations of time and resources, you are not required to carry out the investigation you have planned.

Therefore, you have been provided with a raw data pack, obtained from an organisation which developed and carried out a similar investigation to explore the most environmentally friendly plastic replacements. The raw data pack is in the form of a laboratory information management system (LIMS) spreadsheet.

You must:

- analyse the data provided to measure the effectiveness of the organisation's plan
- produce a report of your analysis, to include
  - presentation of data to enable peer review
  - selection of appropriate statistical techniques
  - application of appropriate statistical techniques
  - justification for your conclusions

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

### Resources

- ESP brief and task 3 student guidance
- computer access
- NCFE CACHE provided LIMS spreadsheet
- project diary

### Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (16 marks)

AO3: Select relevant techniques and resources to meet the needs of a scientific project (6 marks)

AO4: Use English, mathematics and digital skills as appropriate to the development of a scientific project (6 marks)

AO5: Realise a project outcome and review against the intended project aims (6 marks)

### Core skills

CS4: Creativity, innovation

CS5: Problem solving

CS6: Communication (written)

CS7: Reflective evaluation

### The evidence I have to submit for this task

Your analysis report including any charts and graphs.

## **How the evidence will be assessed**

This will be externally marked by examiners.

## **Time allowed for completion of task 3**

3 hours and 30 minutes for completion of your reflective diary.

## Task 4: present outcomes and conclusions

### What you have to do

4(a) Use your report from task 3 to produce an A2 scientific poster.

Your poster must show:

- the problem being addressed/investigated
- the results of your analysis, including any graphs and charts
- your conclusions

4(b) Present the main points from your poster to your tutor. Your tutor will make observations on your presentation and ask questions if further detail is needed. The presentation will be recorded by video.

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

### Resources

- ESP brief and task 4 student guidance
- computer and printer access
- access to NCFE CACHE provided LIMs spreadsheet
- your analysis report
- A2 paper, various coloured markers, scissors and glue
- project diary

### Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (12 marks)

AO3: Select relevant techniques and resources to meet the needs of a scientific project (6 marks)

AO4: Use English, mathematics and digital skills as appropriate to the development of a scientific project (4 marks)

AO5: Realise a project outcome and review against the intended project aims (6 marks)

### Core skills

CS4: Creativity, innovation

CS6: Communication (written and verbal)

CS7: Reflective evaluation

### The evidence I have to submit for this task

Your A2 scientific poster.

Video recording of presentation.

## **How the evidence will be assessed**

This will be externally marked by examiners using the video recording and assessor commentary.

## **Time allowed for completion of task 4**

Part 4(a) 3 hours and 30 minutes for completion of your reflective diary.

Part 4(b) 1 hour.

## Task 5: group discussion

JG Packaging PLC has been forwarded an email from the supermarket that is looking to use new packaging for its sandwich range. The email is from a consumer group who have concerns about the use of beeswax wrapping.

In your research team discuss the concerns the consumer group have raised and how it would be best to respond to these concerns. You will need to refer back to your research notes to contribute effectively to the discussion. It is suggested 10 minutes are given to this at the start of the discussion.

Each group member will then take it in turns to make suggestions and to agree an approach. It is suggested that groups consist of 3 individuals to allow sufficient time for discussion in 30 minutes.

Take notes during the team discussion of the points and suggestions made.

Following the discussion, students will need to (individually) draft an email to the consumer group to respond to the concerns raised (max 20 minutes).

There is an overall time limit of 1 hour for this task. In this time, students will:

- be asked to read the email from the consumer group in their groups
- be given 10 minutes to familiarise themselves with their literature review, their plan, their data analysis and scientific poster
- discuss their suggestions for responding to the consumer group
- draft an email to the consumer group to respond to the concerns raised

**Note: The group discussion and email the student produces will be externally assessed by NCFE.**

### Student resources required

- your literature review (task 1)
- the experience of developing your project plan (task 2)
- your data analysis and report (task 3)
- your A2 scientific poster and its presentation (task 4)

### Tutor resources required

Assessment sheet for tutor commentary.

Video recording equipment.

### Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (4 marks)

AO3: Select relevant techniques and resources to meet the brief (2 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (3 marks)

## **Core skills**

CS3: Working with others

CS4: Creativity, innovation

CS5: Problem solving

CS6: Communication (verbal)

CS7: Reflective evaluation

## **The evidence I have to submit for this task**

Your recorded discussion.

A copy of your e-mail.

## **How the evidence will be assessed**

This will be externally marked by examiners.

## **Time allowed for completion of task 5**

1 hour.



## Task 6: reflective evaluation

### What you have to do

Write a reflective evaluation of your work. This should be based on:

- your literature review (task 1)
- the experience of developing your project plan (task 2)
- your data analysis and report (task 3)
- your A2 scientific poster and its presentation (task 4)
- your project diary
- access to the NCFE CACHE provided food packaging database and the NCFE CACHE provided LIM's spreadsheet
- reflective evaluation template

Your reflections should include:

- an evaluation of your approach to each task, including your chosen tool for analysis
- any changes you would make to your approach to each task

### Resources

- your project diary
- your literature review
- your project plan
- your analysis report
- your A2 scientific poster
- reflective evaluation template

### Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (7 marks)

AO3: Select relevant techniques and resources to meet the needs of a scientific project (2 marks)

AO4: Use English, mathematics and digital skills appropriate to the development of a scientific project (4 marks)

AO5: Realise a project outcome and review against the intended project aims (5 marks)

### Core skills

CS6: Communication (written)

CS7: Reflective evaluation

### The evidence I have to submit for this task

Your written reflective evaluation.

## **How the evidence will be assessed**

This will be externally marked by examiners.

## **Time allowed for completion of task 6**

2 hours.

## Appendix 1: literature list

### Beeswax:

[www.techni-k.co.uk/beeswax/?mc\\_cid=92a6c8f390&mc\\_eid=c596093a76](http://www.techni-k.co.uk/beeswax/?mc_cid=92a6c8f390&mc_eid=c596093a76)

<https://www.independent.co.uk/life-style/food-and-drink/food-waste>

<https://www.fera.co.uk/chemical-regulation/ecotoxicology/bee-ecotoxicology>

### General article about recent developments in packaging:

[www.epda-design.com/10-recent-material-developments-for-packaging/](http://www.epda-design.com/10-recent-material-developments-for-packaging/)

### Composite Chitin film:

[www.physicsworld.com/a/composite-chitin-film-could-replace-plastic-packaging/#:~:text=Researchers%20at%20the%20Georgia%20Institute,for%20food%20and%20consumer%20goods.](http://www.physicsworld.com/a/composite-chitin-film-could-replace-plastic-packaging/#:~:text=Researchers%20at%20the%20Georgia%20Institute,for%20food%20and%20consumer%20goods.)

### Edible packaging:

[www.newfoodmagazine.com/article/215/edible-biodegradable-packaging-for-food/](http://www.newfoodmagazine.com/article/215/edible-biodegradable-packaging-for-food/)

<https://science.howstuffworks.com/.../green-science/edible-packaging.htm>

### Edible packaging:

[www.nationalgeographic.com/environment/future-of-food/food-packaging-plastics-recycle-solutions/](http://www.nationalgeographic.com/environment/future-of-food/food-packaging-plastics-recycle-solutions/)

<https://packagingeurope.com/edible-packaging-receives-uk-government-funding/>

### Paper based bottles:

[www.foodengineeringmag.com/articles/98999-paper-bottles-for-drinks-diageo-pepsico-pursue-plastic-free-package](http://www.foodengineeringmag.com/articles/98999-paper-bottles-for-drinks-diageo-pepsico-pursue-plastic-free-package)

### Composite Chitin film:

[www.sciencedirect.com/science/article/pii/B9780128179666000200](http://www.sciencedirect.com/science/article/pii/B9780128179666000200)

<https://www.independent.co.uk/life-style/food-and-drink/food-waste..>

[https://www.researchgate.net/publication/322881381\\_Applications\\_of\\_Chitosan\\_in\\_Food\\_Packaging](https://www.researchgate.net/publication/322881381_Applications_of_Chitosan_in_Food_Packaging)

### Bamboo:

[www.theodmgroup.com/bamboo-based-packaging/](http://www.theodmgroup.com/bamboo-based-packaging/)

<https://www.pandapackaging.co.uk>

<https://ribble-pack.co.uk/blog/environmental-packaging-products>

<https://www.foodpackagingforum.org/news/re-useable-bamboo-cups-tested>

## Appendix 2: consumer group email

Whilst we appreciate the need to develop new packaging materials due to problems of plastic within the environment, we do have some concerns about the safety of new materials which may be used.

We believe that the use of Beeswax wrapping may prove problematic for some consumers, as beeswax can be allergenic. Many people do have allergic reactions to beeswax so this would need to be taken into serious consideration in terms of these individuals handling the wrap, but also if this would cause any issues with transfer of allergens to the food product itself.

We also have concerns about the Beeswax wrapping being more susceptible to contamination from external sources. It is recognised that food packaging has the potential to transport viruses, and with the current pandemic we are concerned that Beeswax paper will be more susceptible to this.

## Document information

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Owner: Head of Assessment Design

## Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Post approval, updated for publication.		January 2021
v1.1	NCFE rebrand.		September 2021