T-LEVELS | Institute for Apprenticeships & Technical Education

# T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

# Laboratory Sciences

Assignment 1

Assignment brief

v1.1: Additional sample material
20 November 2023
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NCFE CACHE

## T Level Technical Qualification in Science
## Occupational specialism assessment (OSA)

# Laboratory Sciences

### Assignment brief

Assignment 1



## Contents

# Scenario

You work in a microbiology laboratory for a research company. You have been asked to investigate the causative bacteria responsible for a bacterial skin infection. A patient at the local hospital has already been prescribed penicillin, an antibiotic that is used to treat Gram-positive bacteria. The patient has seen no improvement.

A sample of the bacteria has been sent to your laboratory to carry out the Gram stain which will identify whether the bacterial infection is likely a result of a Gram-positive or Gram-negative bacterial species. It is your responsibility to perform initial Gram staining experiments as a first step towards diagnosis. This will determine whether the infection is caused by a Gram-positive penicillin-resistant bacteria.

You have been provided with an agar plate containing bacterial colonies grown from a sample collected by a clinician.

There are 3 tasks in this assessment:

- Task 1: Writing a literature review (that includes a literature search)
- Task 2: Writing the standard operating procedure (SOP) to identify the likely cause of the bacterial infection
- Task 3: Writing a risk assessment for the SOP

# Task 1

Carry out a literature review of the materials in the literature pack provided. Some items are more useful than others. For any sources you use, use the appropriate referencing method.

Using the literature provided, discuss the four points below. These will contribute to the writing of a standard operating procedure (SOP) and the evaluation of data provided:

- information that would help to inform the methods, techniques and equipment used
- how results are determined
- the results expected
- safety considerations

Evaluate the quality of your chosen pieces of literature.

Identify how different species of bacteria are classified via Gram stain.

State how the results obtained will influence the selection of treatment.

(28 marks)
(3 hours)

# Task 2

Write a standard operating procedure (SOP) to allow you to carry out a Gram stain on the patient sample.

The purpose of the Gram stain is to:

- help identify the species of bacteria causing the infection by identifying whether it is Gram-positive or Gram-negative
- to inform the method of treatment for the patient moving forward.

Design and write your SOP.

Your SOP should follow safe working practices. You will be writing a full risk assessment in task 3.

Your SOP should:

- contain a hypothesis in the introduction
- include any necessary controls
- describe how results may be collected, recorded and analysed, including how to identify the Gram status of the bacteria and whether any identification of specific species is possible

(58 marks)
(3 hours)

# Task 3

Write a risk assessment for the procedure described in your SOP (task 2).

You must detail the risks, hazards, and control measures required when receiving, testing and processing the infected samples.

Use the template provided.

(16 marks)
(1 hour)

# Literature list

https://www.ncbi.nlm.nih.gov/books/NBK562156/

https://asm.org/getattachment/5c95a063-326b-4b2f-98ce-001de9a5ece3/Gram-stain-protocol-2886.pdf

https://vlab.amrita.edu/?sub=3&brch=73&sim=208&cnt=2

https://www.healthline.com/health/Gram-stain

https://www.technologynetworks.com/immunology/articles/Gram-positive-vs-Gram-negative-323007

https://www.ncbi.nlm.nih.gov/books/NBK470553/

https://www.medicalnewstoday.com/articles/157973#uses

https://www.cdc.gov/mrsa/community/index.html#:~:text=Maintain%20good%20hand%20and%20body,such%20as%20towels%20and%20razors.

https://www.msdmanuals.com/en-gb/home/infections/bacterial-infections-Gram-negative-bacteria/overview-of-Gram-negative-bacteria

https://www.nhs.uk/conditions/mrsa/#:~:text=MRSA%20is%20a%20type%20of,it%20called%20a%20%22superbug%22.

# Risk assessment guidance

Complete the risk assessment template, including the following:

- identify and list any hazards that you feel apply to your activity
- identify the people that could be harmed by this hazard
- using the risk matrix provided, identify the risk level that this hazard presents
- think about the control measures that you can put in place to reduce the risk of individual hazards
- using the risk matrix provided, identify the new risk level now that control measures are in place to manage the hazard and reduce the risk of injury – please note that the severity level will not always alter, only the likelihood
- continue on a separate sheet if necessary
- sign and review the document

# Risk matrix

| Risk matrix – evaluation of risks | | | | | | | Action level |
|---|---|---|---|---|---|---|---|
| Almost certain | **5** | **5** | **10** | **15** | **20** | **25** | **20–25 STOP** |
| Highly likely | **4** | **4** | **8** | **12** | **16** | **20** | |
| Likely | **3** | **3** | **6** | **9** | **12** | **15** | **12–16 URGENT** |
| Unlikely | **2** | **2** | **4** | **6** | **8** | **10** | **8–10 ACTION** |
| Extremely improbable | **1** | **1** | **2** | **3** | **4** | **5** | **4–6 MONITOR** |
| | **X** | **1** | **2** | **3** | **4** | **5** | **1–3 NO ACTION** |
| | | Minimal | Minor injury | 7 day + injury | Serious or major injury | Severe | |
| | | | **Consequence** | | | | |

# Risk assessment form

| | |
|---|---|
| **Person carrying out risk assessment:** | |
| **Persons responsible on site:** | |
| **Venue:** | |
| **Work activity:** | |
| **Date of assessment:** | |

| THOSE AT RISK | KEY |
|---|---|
| **Own staff** | OWN |
| **Venue staff** | VEN |
| **Organisers** | ORG |
| **Visitors** | VIS |
| **Public** | PUB |
| **Contractors** | CON |
| **All persons onsite** | AOS |

Please read the guidelines prior to completing your risk assessment.

## Section 1

| Hazard | Who might be harmed? (see 'those at risk', above) | Likelihood | Severity | Total risk level | Control measures (add any other control measures you will use) | Likelihood | Severity | Resulting risk level |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |

| Hazard | Who might be harmed? (see 'those at risk', above) | Likelihood | Severity | Total risk level | Control measures (add any other control measures you will use) | Likelihood | Severity | Resulting risk level |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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By signing the declaration below you have agreed that you will put the appropriate control measures in place to ensure that hazards are reduced and that the risks applicable to your stand are controlled.

| | |
|---|---|
| **Signed** | |
| **Print name** | |
| **Review date** | |

# Document information



The T Level Technical Qualification is a qualification managed and approved by the Institute for Apprenticeships and Technical Education. NCFE is currently authorised by the Institute to develop and deliver the T Level Technical Qualification in Science.



Owner: Head of Assessment Design

## Change History Record

| Version | Description of change | Approval | Date of issue |
|---|---|---|---|
| **v1.0** | Additional sample material | | 01 September 2023 |
| **v1.1** | Sample added as watermark | November 2023 | 20 November 2023 |