# Skills Assessment

**Assessment event 3 of 3**

## Criteria

### Unit code, name and release number

MSL974017 - Prepare, standardise and use solutions (1)

### Qualification/Course code, name and release number

MSL40118 - Certificate IV in Laboratory Techniques (1)

MSL50118 – Diploma in Laboratory Technology (1)

\*\*Amend the qualification box before distributing to the student. The information here should only contain the qualification the student is enrolled in\*\*

## Student details

### Student number

### Student name

## Assessment Declaration

* This assessment is my original work and no part of it has been copied from any other source except where due acknowledgement is made.
* No part of this assessment has been written for me by any other person except where such collaboration has been authorised by the assessor concerned.
* I understand that plagiarism is the presentation of the work, idea or creation of another person as though it is my own. Plagiarism occurs when the origin of the material used is not appropriately cited. No part of this assessment is plagiarised.

### Student signature and Date

Version: 1.0

Date created: 28/08/2019

Date modified: 10/12/2019

For queries, please contact:

Innovative Manufacturing, Robotics and Science SkillsPoint

Hamilton Campus

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This assessment can be found in the: [Learning Bank](https://share.tafensw.edu.au/share/access/searching.do?doc=%3Cxml%2F%3E&in=P7ac4831b-430a-4b8d-8b56-f7b32ed5b9cf&q=&type=standard&sort=rank&dr=AFTER)

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## Assessment instructions

Table 1 Assessment instructions

| Assessment details | Instructions |
| --- | --- |
| **Assessment overview** | The objective of this assessment is to assess your skills as would be required to prepare, standardise, use and monitor solutions. |
| **Assessment Event number** | 3 of 3 |
| **Instructions for this assessment** | This is a skill based assessment and will be assessing you on your ability to demonstrate skills required in the unit.  This assessment is in 3 parts:   1. Practical 2. Observation Checklist 3. Assessment Feedback   You are required to complete the:   * preparation * standardisation * use of three solutions and * monitor the quality of laboratory solutions.   You are required to complete the task three times using a different combination of chemicals and to monitor the quality of laboratory solutions. The solutions to be prepared and standardised will be those you have researched in Assessment event 2 of 3, Project.  You are to record all your information on the paperwork provided, including all your calculations.  The task is open book. There is a Periodic Table and a Data Sheet available in the Appendices.  You will be required to locate the appropriate method of standardisation that you will need to follow for the particular chemical combination. It will be available in the laboratory.  You are to complete the “1. **Prepare for task”** section before you enter the laboratory. This section is to be checked and signed off on the Laboratory Record prior to commencement of the remainder of the task. |
| **Submission instructions** | On completion of this assessment, you are required to upload it or hand it to your assessor for marking. Ensure you have written your name at the bottom of each page of this assessment.  It is important that you keep a copy of all electronic and hardcopy assessments submitted to TAFE and complete the assessment declaration when submitting the assessment. |
| **What do I need to do to achieve a satisfactory result?** | To successfully complete this assessment the student will be available at the arranged time to complete all the assessment criteria as outlined in the assessment instructions.  All parts of the observable task must be performed to a satisfactory level as indicated in the criteria section of the Observation Checklist.  All oral questions must be answered correctly to be deemed satisfactory in this assessment task; however, Assessors may ask questions to clarify understanding. |
| **What do I need to provide?** | Calculator, pens, PPE (eye protection, enclosed shoes, protective clothing), reference materials such as class notes. |
| **Due date/time allowed/venue** | To be arranged in 2 hour blocks for each of three occasions |
| **Assessment feedback, review or appeals** | In accordance with the TAFE NSW policy *Manage Assessment Appeals,* all students have the right to appeal an assessment decision in relation to how the assessment was conducted and the outcome of the assessment. Appeals must be lodged within **14 working days** of the formal notification of the result of the assessment.  If you would like to request a review of your results or if you have any concerns about your results, contact your Teacher or Head Teacher. If they are unavailable, contact the Student Administration Officer.  Contact your Head Teacher for the assessment appeals procedures at your college/campus. |

## Specific task instructions

Complete the table for the actual preparation and standardisation reactants

|  |  |
| --- | --- |
| Solution | I have received training in the tasks required for this solution |
| 1. 0.1 M HCl (prepared from 11.4 M HCl. Standardised with 0.05 M Na2CO3 solution | Yes / No |
| 1. 0.1 M NaOH (prepared from solid NaOH) standardised with 0.1 M potassium hydrogen phthalate | Yes / No |
| 1. 0.01M EDTA (prepared from Solid EDTA) standardised with 0.01M Ca2+ (from Ca2+) | Yes / No |

## Part 2: Practical

To complete this part of the assessment, you will be required to participate in a practical demonstration of how to complete a task or activity.

These practicals will be observed by your assessor, or can be digitally recorded and submitted as evidence.

Your responses will be used as part of the overall evidence requirements of the unit.

You should refer to the list of criteria in the Observation Checklist to understand what you need to demonstrate in this section of the assessment. This Checklist outlines the assessment criteria used to assess your performance.

Once completed you will need to submit this assessment and the tasks and activities you are required to complete to your assessor for marking.

**Practical Brief**

* This task will be completed in your laboratory three times using different solutions.
* At the commencement of each session you will be provided with the actual task combination of chemicals.
* The task is open book. (You will be provided with your Project Assessment as a reference)
* You are to fill in the details as required by the procedure in the Laboratory Record.
* There is a page for calculations at the end of the Laboratory Record Sheet for each standardisation.
* You should show all your workings.
* All pages including the Project Assessment are to be returned at the conclusion of each laboratory session.

**Prepare for task**

1. Determine and record the solution(s) to be prepared at this session
2. Determine and record the primary standard for the standardisation
3. Calculate the amount of primary standard to be weighed for preparation of a bulk solution (250 mL) of the primary solution.
4. Calculate (if required) the volume of stock required to prepare 1 L of the secondary standard.
5. Determine the appropriate end-point detection for the reaction.
6. Have this information checked prior to the standardisation.

 You may not continue until you have approval of the Assessor.

**Prepare solutions (Record the PPE required)**

1. Obtain the standard procedures for the preparation of the primary and secondary standards. Record the procedure identifying number (**Note** there may be no procedure for the preparation of the standards as they are already in the form required for the task. In this case enter Not Applicable in the table)
2. Obtain the standard procedure for the standardisation of the secondary standard. Record the procedure identifying number
3. Obtain all required equipment
4. Obtain all reagents required
5. Prepare the stock primary standard solution following the procedure provided and place in labelled container. Noting the actual mass of primary standard taken.
6. Calculate and record the concentration of the primary standard solution, showing your calculations on the Calculation worksheet.
7. Prepare the secondary standard solution (if required) and place in labelled container.
8. Have both the primary and secondary standard solutions checked and verified by the Assessor.

 You may not continue until you have verification by the Assessor.

**Standardisation of secondary solution**

1. Follow the procedure (including correct equipment preparation) for the standardisation recording:
   * the aliquot of primary standard taken (mL)
   * Indicator
   * titration volumes (mL)
2. Calculate the concentration of the secondary standard. Show you calculations on the Calculation worksheet. Record the Concentration of the secondary solution
3. Determine the relative precision of concentration of your secondary standard using the volume of titrant value.

**Analyse an unknown using the standardised secondary solution**

1. Obtain from your assessor the unknown solution and record the sample number.
2. Obtain from your assessor the standard procedure for the analysis of the unknown solution. Record the standard procedure number and title.
3. Follow the procedure provided and analyse the unknown using your standardised solution.
4. Record your results.
5. Calculate the % Relative precision of your titration volumes.
6. Calculate the concentration of the analyte as required by the procedure.
7. Ensure work area is left clean and tidy, all solutions returned to correct location in the laboratory and all wastes are properly disposed of according to the standard procedure

**Monitor laboratory solutions**

1. Check the available stock solutions and note if they are satisfactory or have deteriorated.
2. Record your findings on the Laboratory Record.



**Laboratory Record**

Analyst: Date:

**Standardisation 1**

1. **Prepare for task**

|  |  |
| --- | --- |
| 1. The solution(s) to be prepared |  |
| 1. Primary standard |  |
| 1. Mass of primary standard (g) |  |
| 1. Volume of stock secondary standard (mL) or Mass of chemical for secondary standard |  |
| 1. Indicator |  |
| 1. Assessor signature |  |

 Ensure your assessor has signed off at 1 f above prior to commencing the next section.

1. **Prepare solution**

|  |  |
| --- | --- |
| PPE required (remembering a safety breach will see the task stopped immediately) |  |
| 1. Procedure number and title (primary standard preparation) |  |
| 1. Procedure number and title (secondary standard preparation) |  |
| 1. Procedure number and title standardisation (secondary standard) |  |
| 1. Mass of primary standard (g) |  |
| 1. Calculated concentration of the primary standard solution using the actual mass taken |  |
| 1. Assessor verification of solutions |  |

1. **Standardisation of secondary standard**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Aliquot of primary standard (mL) |  | | | |
| 1. Volume of titrant (mL) |  |  |  |  |
| 1. Concentration of secondary standard (mol / L) |  | | | |
| 1. Relative precision (%) |  | | | |

1. **Unknown analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Unknown sample number |  | | | |
| 1. Unknown procedure number/title |  | | | |
| 1. Aliquot of unknown taken (mL) |  | | | |
| 1. Volume of titrant (secondary standard) (mL) |  |  |  |  |
| 1. Relative precision (%) |  | | | |
| 1. Concentration of unknown |  | | | |

1. **Solution Monitoring**

|  |  |  |  |
| --- | --- | --- | --- |
| Check | Solution | Solution | Solution |
|  |  |  |  |
|  | **Observation** | **Observation** | **Observation** |
| Turbidity |  |  |  |
| Deposits |  |  |  |
| Crystallisation |  |  |  |
| Colour change |  |  |  |
| Expiry dates |  |  |  |
| Other |  |  |  |
|  |  |  |  |

Analyst comments:

Analyst signature:



**Calculation Worksheet**

Analyst: Date:

**Standardisation 1**



**Laboratory Record**

Analyst: Date:

**Standardisation 2**

1. **Prepare for task**

|  |  |
| --- | --- |
| 1. The solution(s) to be prepared |  |
| 1. Primary standard |  |
| 1. Mass of primary standard (g) |  |
| 1. Volume of stock secondary standard (mL) or Mass of chemical for secondary standard |  |
| 1. indicator |  |
| 1. Assessor signature |  |

 Ensure your assessor has signed off at 1 f above prior to commencing the next section.

1. **Prepare solution**

|  |  |
| --- | --- |
| PPE required (remembering a safety breach will see the task stopped immediately) |  |
| 1. Procedure number (primary standard preparation) |  |
| 1. Procedure number (secondary standard preparation) |  |
| 1. Procedure standardisation (secondary standard) |  |
| 1. Mass of primary standard (g) |  |
| 1. Calculated concentration of the primary standard solution using the actual mass taken |  |
| 1. Assessor verification of solutions |  |

1. **Standardisation of secondary standard**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Aliquot of primary standard (mL) |  | | | |
| 1. Volume of titrant (mL) |  |  |  |  |
| 1. Concentration of secondary standard (mol / L) |  | | | |
| 1. Relative precision (%) |  | | | |

1. **Unknown analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Unknown sample number |  | | | |
| 1. Unknown procedure number/title |  | | | |
| 1. Aliquot of unknown taken (mL) |  | | | |
| 1. Volume of titrant (secondary standard) (mL) |  |  |  |  |
| 1. Relative precision (%) |  | | | |
| 1. Concentration of unknown |  | | | |

1. **Solution Monitoring**

|  |  |  |  |
| --- | --- | --- | --- |
| Check | Solution | Solution | Solution |
|  |  |  |  |
|  | **Observation** | **Observation** | **Observation** |
| Turbidity |  |  |  |
| Deposits |  |  |  |
| Crystallisation |  |  |  |
| Colour change |  |  |  |
| Expiry dates |  |  |  |
| Other |  |  |  |

Analyst comments:

Analyst signature:



Calculation Worksheet

Analyst: Date:

**Standardisation 2**



Laboratory Record

Analyst: Date:

**Standardisation 3**

1. **Prepare for task**

|  |  |
| --- | --- |
| 1. The solution(s) to be prepared |  |
| 1. Primary standard |  |
| 1. Mass of primary standard (g) |  |
| 1. Volume of stock secondary standard (mL) or Mass of chemical for secondary standard |  |
| 1. indicator |  |
| 1. Assessor signature |  |

 Ensure your assessor has signed off at 1 f above prior to commencing the next section.

1. **Prepare solution**

|  |  |
| --- | --- |
| PPE required (remembering a safety breach will see the task stopped immediately) |  |
| 1. Procedure number (primary standard preparation) |  |
| 1. Procedure number (secondary standard preparation) |  |
| 1. Procedure standardisation (secondary standard) |  |
| 1. Mass of primary standard (g) |  |
| 1. Calculated concentration of the primary standard solution using the actual mass taken |  |
| 1. Assessor verification of solutions |  |

1. **Standardisation of secondary standard**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Aliquot of primary standard (mL) |  | | | |
| 1. Volume of titrant (mL) |  |  |  |  |
| 1. Concentration of secondary standard (mol / L) |  | | | |
| 1. Relative precision (%) |  | | | |

1. **Unknown analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Unknown sample number |  | | | |
| 1. Unknown procedure number/title |  | | | |
| 1. Aliquot of unknown taken (mL) |  | | | |
| 1. Volume of titrant (secondary standard) (mL) |  |  |  |  |
| 1. Relative precision (%) |  | | | |
| 1. Concentration of unknown |  | | | |

1. **Solution Monitoring**

|  |  |  |  |
| --- | --- | --- | --- |
| Check | Solution | Solution | Solution |
|  |  |  |  |
|  | **Observation** | **Observation** | **Observation** |
| Turbidity |  |  |  |
| Deposits |  |  |  |
| Crystallisation |  |  |  |
| Colour change |  |  |  |
| Expiry dates |  |  |  |
| Other |  |  |  |

Analyst comments:

Analyst signature:



Calculation Worksheet

Analyst: Date:

**Standardisation 3**

## Part 2: Observation Checklist

The Observation Checklist will be used by your assessor to mark your performance in the Skills Assessment. Use this Checklist to understand what skills you need to demonstrate in the practical. The Checklist lists the assessment criteria used to determine whether you have successfully completed this assessment event. All the criteria must be met. Your demonstration will be used as part of the overall evidence requirements of the unit. The assessor may ask questions while the demonstration is taking place or if appropriate directly after the task/activity has been completed.

| Step | Instruction |  | | |  | | | |  | | | | Assessor Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Solution | 1. | | | 2. | | | | 3. | | | | PPE required (remembering a safety breach will see the task stopped immediately)Describe the student’s ability in demonstrating the required skills and knowledge) |
|  | Date: |  | | |  | | | |  | | | |
|  |  | S | US | | S | | US | | S | | US | |
|  |  | | | | | | | | | | | | |
|  | **Prepare for task (record all amounts)** |  | | | | | | | | | | | |
|  | Determines and records the solutions to be prepared |  | |  | |  | |  | |  | |  |  |
|  | Determines the primary standard |  | |  | |  | |  | |  | |  |  |
|  | Calculates the mass of primary standard to prepare 250 mL |  | |  | |  | |  | |  | |  |  |
|  | Calculate volume of stock for the secondary standard (if required) or the mass of the chemical required to prepare the secondary standard |  | |  | |  | |  | |  | |  |  |
|  | Determines appropriate endpoint detection |  | |  | |  | |  | |  | |  |  |
|  | Has values checked |  | |  | |  | |  | |  | |  |  |
|  | **Prepare solutions** |  | | | | | | | | | | | |
|  | Obtains the procedures for preparation of primary and secondary standard solutions. (if required) |  | |  | |  | |  | |  | |  |  |
|  | Obtains procedure for standardisation of secondary solution. |  | |  | |  | |  | |  | |  |  |
|  | Obtains and assembles all equipment as requires |  | |  | |  | |  | |  | |  |  |
|  | Obtains all reagents |  | |  | |  | |  | |  | |  |  |
|  | Prepares primary standard stock solution, noting mass of primary standard taken |  | |  | |  | |  | |  | |  |  |
|  | Places stock in labelled container |  | |  | |  | |  | |  | |  |  |
|  | Calculates the concentration of primary stock solution using the actual mass taken. |  | |  | |  | |  | |  | |  |  |
|  | Has both solutions checked |  | |  | |  | |  | |  | |  |  |
|  | **Standardisation of secondary solution** |  | |  | |  | |  | |  | |  |  |
|  | Follows procedure for standardisation noting:   * Correct equipment preparation * Primary standard aliquot * indicator * Titration volumes |  | |  | |  | |  | |  | |  |  |
|  | Concentration of secondary standard determined |  | |  | |  | |  | |  | |  |  |
|  | % Relative precision calculated and recorded |  | |  | |  | |  | |  | |  |  |
|  | **Unknown analysis** |  | |  | |  | |  | |  | |  |  |
|  | Obtains sample and records sample number |  | |  | |  | |  | |  | |  |  |
|  | Obtains procedure for unknown analysis and records title and procedure number |  | |  | |  | |  | |  | |  |  |
|  | Dispense aliquot required |  | |  | |  | |  | |  | |  |  |
|  | Titrates and records titres using appropriate indicator |  | |  | |  | |  | |  | |  |  |
|  | Calculates unknown concentration |  | |  | |  | |  | |  | |  |  |
|  | Calculates % Relative precision using titration volumes |  | |  | |  | |  | |  | |  |  |
|  | Ensures work area is left clean and tidy and all solutions, chemicals and equipment is returned to store. |  | |  | |  | |  | |  | |  |  |
|  | **Monitor solutions** |  | |  | |  | |  | |  | |  |  |
|  | Checks stock solutions for visual deterioration and expiry dates |  | |  | |  | |  | |  | |  |  |
|  | Reports stock monitoring |  | |  | |  | |  | |  | |  |  |
| **Additional questions** | | | | | | | | | | | | | |
| **Question asked:**  **Response:**  **Question asked:**  **Response:** | | | | | | | | | | | | | |

## Part 3: Assessment Feedback

*NOTE: This section* ***must*** *have the assessor signature and student signature to complete the feedback.*

### Assessment outcome

Satisfactory

Unsatisfactory

### Assessor Feedback

Was the assessment event successfully completed?

If no, was the resubmission/re-assessment successfully completed?

Was reasonable adjustment in place for this assessment event?  
*If yes, ensure it is detailed on the assessment document.*

Comments:

### Assessor name, signature and date:

### Student acknowledgement of assessment outcome

Would you like to make any comments about this assessment?

### Student name, signature and date

***NOTE: Make sure you have written your name at the bottom of each page of your submission before attaching the cover sheet and submitting to your assessor for marking.***

**APPENDICES**

Data Sheet

|  |  |
| --- | --- |
| Molarity = | [Mass ÷ V(L)] x Formula mass  or  No of mole ÷ V (L) |
| Moles = | Mass / Formula mass  or  C x V (L) |
| Dilution Factor = | Final Volume  Initial Volume |
| Average = | Sum of readings  No. of readings |
| Range = | (highest Value – lowest Value) |
| Absolute precision = | Range  2 |
| Relative precision = | (absolute precision) x 100%  average |
| Accuracy = | [(True Value – Average Value)] ÷ True x 100 |
| % w/w = | (grams of solute / grams of sample) x 100 |
| % v/v = | (mL of solute / mL of solution) x 100 |
| % w/v = | (grams of solute/ mL of solution) x 100 |
| ppm = | (mg of analyte / mL of solution) x 1000 |

