# Skills Assessment: Solution Preparation

**Assessment event 1 of 2**

# Trainer & Assessor Marking Guide

## Criteria

### Unit code, name and release number

MSL973014 - Prepare working solutions (1)

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

MSL30118 - Certificate III in Laboratory Skills (1)

MSL40118 - Certificate IV in Laboratory Techniques (1)

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

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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 |
| --- | --- |
| **Instructions for the trainer and assessor** | This is a skill based assessment and will be assessing the student on their ability to demonstrate skills required in the unit.  This assessment is in three parts:   1. Practical 2. Observation Checklist 3. Assessment Feedback (Student facing document)   For this assessment task you will need to select five solutions for students to prepare.  For example, a typical assessment set of solutions could be:   1. Preparation of a stock solution 2. Dilution of a stock solution 3. Preparation of a dye/indicator/stain 4. Preparation of a solution from an initial solid mass 5. Preparation of a standard solution.   The solutions you select must meet the performance evidence in the unit.  The unit also requires students monitor laboratory solutions for suitability of use.  For example, monitoring solutions for suitability could include checking:   * Use-by-dates (if applicable) * Discoloration of solution * Evidence of biological growth * Turbidity * Crystallisation   At each scheduled assessment date you will provide the student with the identity of the exact solution to be prepared and a number of solutions to check for suitability of use.  The assessment is open book.  The assessment criteria for each solution are the same. The solutions chosen will need to have the following available for the student at the time of assessment:   * Standard Method (SOP) for the solution preparation * Current Safety Data Sheets * Periodic Table * Appropriate equipment for the preparation (this could include beakers, volumetric flasks, analytical balance, bulb pipettes, actual chemicals in either solid or liquid form, weigh boats, purified water, solutions for validation if required) * Reporting/recording facilities   Where the student is asked to determine the quantity of material to be weighed, measured, they are to check with you prior to commencement that the quantity is correct. If correct the student will progress to the actual preparation. If the value is incorrect you will ask the student to have another look at the calculation and resubmit the answer.  Where validation (as specified in the relevant Standard Method (SOP) is against a standard solution the standard must be prepared prior to the assessment.  Ensure the Standard Methods (or SOPs) used in the assessment are kept with the completed student assessments so they are available for audit if required.  Model answers, sample responses or a criteria for each task or activity is provided below.  Use these to support your judgement when determining a satisfactory result.  The student’s response to each question must contain the information indicated in this marking guide in order for their response to be correct. However, if a student provides information other than indicated below, and in the professional opinion of the assessor it is appropriate and meets the intent of the question, it may be considered correct.  Complete the Observation Checklist for each task and activity and the Assessment Feedback to the student. Ensure you have taken a copy of the assessment prior to it being returned to the student.  The Assessment Feedback page must be signed by both the student and the assessor so the student displays that they have received, understood and accepted the feedback.  Ensure the students name appears on the bottom of each page of the submitted assessment. |
| **About this marking guide** | The student’s response to each task or activity must contain the criteria indicated in this marking guide in order for their response to be correct.  All tasks and activities must be completed correctly in order to satisfactorily complete this assessment event.  Assessors will need to make a judgement call as to whether each response meets the criteria based upon the:   * Rules of Evidence:   + Validity – does the answer address the skill required and does the evidence reflect the four dimensions of competency?   + Sufficiency – is the task or activity sufficient in terms of length and depth?   + Currency – has the work been done so recently as to be current?   + Authenticity – is this work the student’s own authentic work? * Principles of Assessment   + Fairness – individual student’s needs are considered in the assessment process   + Flexibility – assessment is flexible to the individual student   + Validity – any assessment decision is justified, based on the evidence of performance of the student   + Reliability – evidence presented for assessment is consistently interpreted and assessment results are comparable irrespective of the assessor conducting the assessment * Dimensions of competency   + Task skills   + Task Management Skills   + Contingency Planning Skills   + Job Role Environment Skills |
| **Student must provide** | Scientific calculator, pens, PPE (safety glasses, enclosed shoes, laboratory coat/overall), class notes as reference. |
| **Assessor must provide** | Periodic Table, data sheets, reference text, organisational policy etc that is referenced in the assessment. These may be hard copy or made available online. Ensure Standard Methods (SOPs) are available for each solution to be prepared and the safety data sheet (SDS) for each solution to be prepared. Provide all the required equipment and reagents for the chosen solutions as well as a selection of solutions for the monitoring of shelf life. |
| **Due date/time allowed/venue** | 90 minutes for each solution preparation  Date TBA |

## Part 1: Practical

To complete this part of the assessment, the student is required to participate in a practical demonstration of:

* safely preparing a solution
* validating the solution (if required)
* storing the solution correctly
* cleaning up the preparation area
* checking shelf solutions in the area for suitability of use
* recording results on the Laboratory Record

There must be five instances of the solution preparation over time.

These practicals must be observed by you.

The student 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 skills the student is required to demonstrate in this section of the assessment. This Checklist outlines the Performance Criteria, Performance Evidence and Assessment Conditions you will be marking the student on.

Once completed the student is required to submit this assessment and the tasks and activities required to be completed to you for marking.

**Preparation of solution (Solutions 1-5)**

For each solution the following is a general procedure. It is important that you follow the directions provided in the Standard Method (SOP) for each chosen solution.

**Initial Preparation (Solutions 1-5)**

1. Ensure you wear PPE at all times. (The task will be stopped for any breach of safety requirements).
2. Obtain, from your assessor, the identity of the solution you are to prepare and record this on the Laboratory Record sheet.
3. Determine the mass of solute or volume for dilution to complete the required preparation.
4. Record these calculations and the calculated value on the Laboratory Record sheet.
5. Have your calculation checked and the value verified by your assessor before proceeding with the preparation.

 Do not continue until you have approval of the Assessor.

1. Obtain the Standard Method (SOP) for the allocated solution. Record the location of the procedure.
2. Read and note on Laboratory Record sheet the information relating in particular to the PPE, hazards and storage of the chemical using either the Standard Method (SOP) or SDS or both.
3. Referring to the Standard Method (SOP) obtain all equipment required for the preparation and record on the Laboratory Record sheet .
4. Obtain the correct grade of chemical as indicated by the Standard Method (SOP).

**Solution Preparation (Solutions 1-5)**

1. Prepare the solution following the Standard Method (SOP).
2. Transfer the solution to an appropriately labelled storage vessel.

**Finalisation (Solutions 1-5)**

1. Perform the validation check or visual check of the solution as required and record on Laboratory Record sheet.
2. Clean and tidy all work areas.
3. Ensure you dispose of waste materials, ensuring disposal is in accordance with the Standard Method (SOP).
4. Check stock solutions for suitability (noting use-by-dates, discoloration, cloudiness, precipitates, algae growth etc).
5. Action solution check if applicable.
6. Record all information following the laboratory protocols (including the Laboratory Record Sheet accompanying this document) and submit all paperwork to you Assessor

| Laboratory Record  Solution Preparation 1  This example worked for Preparation of 1 L 0.1 M NaOH from AR NaOH | | | |
| --- | --- | --- | --- |
| Date: Student to enter the actual date for the solution preparation | AnalystStudent to enter the actual date for the solution preparation | | Standard Method (SOP) Number/Name  Student to indicate the identification number and name of the document  For example: M111 Preparation of 0.1M NaOH |
| Solution to be prepared**:** Student to identify the allocated solution.  For example: Sodium hydroxide | | Concentration to be prepared:student to record the allocated concentration. For example: O.1 M  Dilution required Yes  No If there is a dilution, student records Yes, or No if no dilutions | |
| SDS information:  a. PPE**:** enclosed footwear, laboratory coat, safety glasses  b. Spill Control: do not allow to enter drains  c. DisposalSolid NaOH**:**small amounts could be washed down sink with copious amounts of water.  0.1M NaOH: Absorb with dry agent, dilute with water  d. Hazards:powder and solution are corrosive  e. Other:Goodventilation required | | Calculation of mass to be taken from solid chemical or volume to be taken stock solution or dilution required   1. Student working to be shown   For example:Mass NaOH = 0.1 x 40 = 4g  b. Assessor verificationAssessor to sign | |
| Equipment and chemicals required for preparation and storage:   * 600mL beaker * Stirring rod * Weigh boat x 2 * 3 decimal place balance * 1 L labelled plastic storage bottle (label should note 0.1 M NaOH, GHS symbol for corrosive and signal word ‘warning’ | | Mass of chemical weighed OR volume of stock taken (dilution)  Mass NaOH weighed = 4.02 g  (Note the method would most likely not ask for the mass to be accurate as this solution would be standardised, Student would not be expected to standardise the solution | |
| Solution validation (if required) (Test)  Not applicable | | Standard ValueNot Applicable  Solution valueNot Applicable | |
| Shelf solutions check, note solutions requiring action | | None of the supplied solutions were out of date.  All appeared | |
| Waste disposal and collection arranged (if required) | | Not applicable as all solutions were OK | |
| Analyst signature**:** Studentto sign | | Trainer signature: | |
| Comments:  Student may make comment on amount of NAOH pellets if low to enable reordering,  Student should note if there were any issues during the preparation.  There maybe no comments applicable in this section for this particular solution.  The Assessor is to use their judgement | | | |

The student facing version of the assessment contains five blank Laboratory Record sheets.

## Part 4: Observation Checklist

The Observation Checklist will be used by you to mark the students’ performance in this task. Use this Checklist to understand what skills the student is required to demonstrate in this section of the assessment. This Checklist outlines the Performance Criteria, Performance Evidence and Assessment Conditions you will be marking the student on. All the criteria must be met. The student’s demonstration will be used as part of the overall evidence requirements of the unit.

You may ask questions while the demonstration is taking place or, if appropriate, directly after the task/activity has been completed. These and the responses provided must be recorded.

The observations required are the same for each of the 5 solution preparation tasks. On the day of the assessment students should be advised of the solution they will be preparing and the required concentration.

The expected observations are expected to be the same for all 5 instances of the prepared solutions. The solution to be prepared will be identified to the student on the day of each assessment.

Table 2 Observation Checklist

| Step | Activity | Solution 1 | | Solution 2 | | Solution 3 | | Solution 4 | | Solution 5 | | Assessor Comments  (Describe the student’s ability in demonstrating the required skills and knowledge |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Date: |  | |  | |  | |  | |  | | The task will be stopped immediately if there is a breach of safety requirements |
|  |  | S | US | S | US | S | US | S | US | S | US |  |
|  | **Initial Preparation** |  |  |  |  |  |  |  |  |  |  |  |
|  | Student: |  |  |  |  |  |  |  |  |  |  |  |
| 1 | Wears correct PPE |  |  |  |  |  |  |  |  |  |  | Typically this would be safety glasses, lab coat (or workplace long sleeved shirt and trousers) enclosed flat shoes, long hair tied back).  You will need to ensure additional requirements according to the solution being prepared. Eg Conc acids may need to be in the fume cupboard and appropriate gloves worn) |
| 2 | Identifies the solution to be prepared and notes on Laboratory Record |  |  |  |  |  |  |  |  |  |  | Student identifies the solution to be prepared. Student records as per bench mark sample Laboratory Record |
| 3 | Calculated the correct amount of material to be measured for the required concentration |  |  |  |  |  |  |  |  |  |  | Calculations correct for the particular solution. Student records as per bench mark sample Laboratory Record |
| 4 | Recorded mass (or volume) on Laboratory Record |  |  |  |  |  |  |  |  |  |  | Student records as per bench mark sample Laboratory Record |
| 5 | Checked the mass (or volume) for approval to continue |  |  |  |  |  |  |  |  |  |  | Student checks with Assessor and has lab record validated. Student records as per bench mark sample Laboratory Record |
| 6 | Obtained the Standard Method (SOP) for the preparation of the required solution. |  |  |  |  |  |  |  |  |  |  | You will need to have the Standard Method (SOP), available for the student and appropriate storage vessels. Student records as per bench mark sample Laboratory Record. |
| 7 | Obtained the correct SDS and notes required information |  |  |  |  |  |  |  |  |  |  | Correct SDS obtained and information recorded on sheet. Student records as per bench mark sample Laboratory Record. |
| 8 | Obtained the correct equipment |  |  |  |  |  |  |  |  |  |  | Chooses the most appropriate from those available. Student records as per bench mark sample Laboratory Record |
| 9 | Obtained the correct chemicals ensuring a minimum taken and correct grade |  |  |  |  |  |  |  |  |  |  | Checks grade of chemical, use-by-date, etc. Student records as per bench mark sample Laboratory Record. |
|  | **Solution Preparation** |  |  |  |  |  |  |  |  |  |  |  |
|  | Student: |  |  |  |  |  |  |  |  |  |  |  |
| 10 | Prepared solution following the Standard Method (SOP) |  |  |  |  |  |  |  |  |  |  | Sample comments (will vary according to the method used):  Measures the predetermined quantity as per Laboratory Record.Student records as per bench mark sample Laboratory Record.  Uses fumehood if required, quantitative transfer of solid or liquids if required. If a spill occurs this is cleaned up immediately.  Uses beaker and stirrer, if a solid is being dissolved, rather than directly into the storage vessel or volumetric flask  Uses purified water to make up to volume. Correct meniscus, caps and gently mixes. |
| 11 | Transferred to correctly labelled shelf container |  |  |  |  |  |  |  |  |  |  | Correct container labelled appropriately (with signal words, GHS pictograms etc) |
|  | **Finalisation** |  |  |  |  |  |  |  |  |  |  |  |
|  | Student: |  |  |  |  |  |  |  |  |  |  |  |
| 12 | Validated solution if required according to standard method (SOP) .  Solutions returned to shelf in correct container with correct labelling. |  |  |  |  |  |  |  |  |  |  | Standard Method (SOP) would indicate if the final solution is to be validated. . Student records as per bench mark sample Laboratory Record, noting test required, at 11 records Standard value and at 12 records the solution value  Student ensures solutions is placed in the correct storage area of the laboratory. |
| 13 | Cleaned work area |  |  |  |  |  |  |  |  |  |  | Any spills cleaned according to SDS and workplace protocols. Equipment cleaned and put away. Solutions prepared stored appropriately |
| 14 | Safely disposed of wastes |  |  |  |  |  |  |  |  |  |  | Uses laboratory protocols as indicated in the relevant Standard Method (SOP). Student records as per bench mark sample Laboratory Record |
| 15 | Checks stocks of working solutions |  |  |  |  |  |  |  |  |  |  | Student is to identify the solutions that are no longer useable eg out-of-date, discoloured, contain precipitate, turbid Student records as per bench mark sample Laboratory Record. |
| 16 | Removes solutions that must be replaced to designated area |  |  |  |  |  |  |  |  |  |  | Student arranges disposal of solutions that will not be used. Student records as per bench mark sample Laboratory Record. |
| 17 | Records all solution information according to laboratory protocols |  |  |  |  |  |  |  |  |  |  | Student should enter solution preparation details into workplace system if available and completes the Laboratory Record sheet. |
|  | **Additional questions asked to clarify understanding (if required)** |  |  |  |  |  |  |  |  |  |  |  |
| Question:  Student response:  Question:  Student Response: | | | | | | | | | | | | |