



# MEDICAL LABORATORY

NTQF Level III

## Learning Guide -41

<b>Unit of Competence</b>	<b>Prepare Laboratory Solutions</b>
<b>Module Title:</b>	<b>Preparing Laboratory Solutions</b>
<b>LG Code:</b>	<b>HLT MLT3 M08 LO3-LG-41</b>
<b>TTLM Code:</b>	<b>HLT MLT3 TTLM 1019v1</b>

### **LO 2: Monitor the quality of laboratory solutions**



<b>Instruction Sheet</b>	<b>Learning Guide #-</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Methods of checking the quality of solution
- Monitoring the quality of stored solution
- Recording quality monitoring

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- check the quality of prepared solution before use
- monitor the quality of stored solution
- record Quality monitoring details

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4,---”**in page ---, ---, --- and ---** respectively.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” ,---”**in page - --, ---, --- and ---** respectively
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ”**in page ---.**
6. Do the “LAP test” **in page – ---**



## Information Sheet-1

## Methods of checking the quality of solution

### 1.1. Introduction

- Quality check up can be performed in two ways
  - ✓ Physically
  - ✓ Chemically

#### 1.1.1. Checking quality of solution Physically

- This is done by Checking reagents for visual deterioration and observing expiry date  
Reagents must be visually inspected for
  - ✓ Cloudiness/ turbidity
  - ✓ Color change
  - ✓ particulate matter
  - ✓ Volume
  - ✓ Container
  - ✓ Expiration
  - ✓ Label
  - ✓ Evaporation
  - ✓ Leakage
  - ✓ Stopper
  - ✓ Storage condition
  - ✓ Adulteration/Contamination

#### 1.1.2. Checking quality of solution chemically

- In each day of use, one must confirm that the reagents react as expected when used as described in the laboratory's procedure manual.
- If a reagent does not give the expected result, it is a sign of deterioration.
  - ✓ Change in staining xics
  - ✓ alteration of PH
  - ✓ poor preservation
  - ✓ Solute concentration (isotonicity)
  - ✓ Stated parameters of performance (absorbance, controls...)



<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. No matter how the solution is prepared and stored, it will deteriorate over time  
A. True B. False
  
2. The Quality of solutions can be check up by  
A. Physically  
B. Chemically  
C. all

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 3 points**

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



## Information Sheet-2

## Monitoring the quality of stored solution

### 2.1. Check solutions for visual deterioration and expiry date.

- A carefully prepared solution will only be viable for a certain period of time. No matter how the solution is prepared and stored, it will deteriorate over time. Deterioration can be caused by many factors.
- The following factors can reduce the quality of laboratory solutions.
  - ✓ **Incorrect Storage** - temperature, light and cleanliness are all factors here
  - ✓ **Chemical Contamination** - caused by sloppy procedures
  - ✓ **Microbial Contamination** - reagents may be autoclaved to avoid this
  - ✓ **Chemical Instability** - unstable reagents may break down or react to form other chemicals
  - ✓ **Calculation Error** - not a cause of deterioration necessarily, but a significant quality concern
  - ✓ **Precipitation** - reagent components may precipitate out of solution and sometimes adhere strongly to the interior of the container (eg protein solutions) thus reducing the molarity of the solution.
- Many of the factors mentioned previously can be controlled by 'shelf life'. If it takes six months for a reagent to deteriorate to a point where it is no longer usable, then putting a shelf life of three months on the container should solve the problem.
- This, of course, relies on the user checking solutions for visual deterioration and expiry dates. In microbiology laboratories it is second nature to check expiry dates and then to hold reagents, growth media etc up to the light and look for evidence of microbial contamination.

- Always check expiry dates and check the solution visually for signs of deterioration.

### 2.2. Re standardize or dispose of dated or deteriorated solutions

- Some solutions may not need to be discarded. For example, at expiry date, a 0.1M solution of sodium hydroxide may appear as clear and as fresh as the day it was made. An alternative to disposal is to re standardize the reagent. How do you find out it is safe to use?



- Sometimes reagents are beyond help. In the previous activity, the reagent might now have a very low molarity. This may indicate that the reagent container was not airtight or that there has been contamination of the reagent, eg carbon dioxide in the atmosphere would react with the sodium hydroxide. In these situations and in analyses that are very reagent sensitive or significant, the best approach is to discard the reagent.
- Max, the Senior Technician, asks you to discard those stock solutions you determined were deteriorated. He suggests you follow the correct procedure for waste disposal contained in the OHS Manual under **SOP**





### Information Sheet-3

### Recording quality monitoring

#### 3.1 Recording quality monitoring

- Each reagent has been given a number.
- The reagents required and their numbers are indicated in the description of each technique.
- An alphabetical list of all the reagents used, with the numbers assigned to them, their composition, methods of preparation and storage requirements appears in the Annex at the end of the manual.





<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. The description of quality monitoring techniques of each reagents should be recorded.  
A. True  
B. False

**Note: Satisfactory rating - 5 points**

**Unsatisfactory - below 5points**

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**



## List of Reference Materials

### 1- BOOKS

- Monica Cheesbrough, District laboratory practice in tropical countries., Part I, II Cambridge University; 1998
- Jean Jorgenson Linne, Karen Munson Ringsrud., Basic Techniques for the medical Laboratory, 2nd ed., university of Minnesota; 1979.
- John Bernhard Henry. , Clinical Diagnostic and management by laboratory methods, 17th ed.W.B. Saunders Company Philadelphia, All India Traveller Book seller Delhi; 1989.
- AssamenewKassa, MistireWolde, BelayhunKiberat, Urinalysis for medical laboratory technology students lecture note series.,Dilla college of health sciences ; 2002.
- ZewdneshSahlemariam,Haematology for Medical Laboratory Technology Students; lecture note series.Jimma university faculty of public health; 2002.
- GirmaMekete, Mohamed AwelAdem, Parasitology for Medical Laboratory Technology., Students lecture notes series, 1st edition, Jimma university faculty of public health; 2002

#### Prepared By

No	Name	Educational Back grund	LEVEL	Region	College	Email	Phaone Number
1	Kalicha Boru	Laboratory	B	oromia	Nagelle HSC	<a href="mailto:boru9683@gmail.com">boru9683@gmail.com</a>	0912493885
2	Furo Beshir	Laboratory	A	Harari	Harar HSC	<a href="mailto:nebi.furo@gmail.com">nebi.furo@gmail.com</a>	0911739970
3	Motuma Chali	Laboratory	B	oromia	Nekemte HSC	<a href="mailto:lammiifcaalii@gmail.com">lammiifcaalii@gmail.com</a>	0938456753
4	Abdirahman Mahad	Laboratory	A	Somali	Jiggiga HSC	<a href="mailto:abdirahman7584@gmail.com">abdirahman7584@gmail.com</a>	0911044715
5	Adisu Tesfaye	Laboratory	B	Somali	Jiggiga HSC	<a href="mailto:adistesfaye21@gmail.com">adistesfaye21@gmail.com</a>	0931747320
6	Kebebe Tadesse	Laboratory	B	BGRS	Pawi HSC	<a href="mailto:kebebetadesse@gmail.com">kebebetadesse@gmail.com</a>	0926841290
7	Tagel Getachew	Laboratory	A	Harari	Harar HSC	<a href="mailto:tagagetachew@gmail.com">tagagetachew@gmail.com</a>	0915746748