Mineral Resources Infrastructure Work

NTQF Level -1

Learning Guide -49

Unit of Competence: - Read and Interpret Laboratory Procedures and Specifications

Module Title: - Reading and interpreting laboratory procedures and specifications

LG Code: **MIN MRI1 M13 LO1-LG-49**

TTLM Code: **MIN MRI1 TTLM 0819v1**

LO No5: Read and interpret specifications

Instruction sheet	**Learning Guide 49**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Identifying Job specifications from procedures, notes and descriptions
- Identifying standards of work, finishes and tolerances from the laboratory specifications
- Basic calculations of weight, volumes &percentage
- Identifying material attributes from specifications

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 –**

- Identify Job specifications from procedures, notes and descriptions.
- Identify Standards of work, finishes and tolerances from the Laboratory specifications.
- Identify Material attributes from specifications

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 1 up to self- check 4" page 3,5,8 and 12respectively**.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Identifying Job specifications from procedures, notes and descriptions

1.**Introduction**:- A model is interesting if it is easily understood by humans, valid on new or test data with some degree of certainty, potentially useful, novel, or validates some hypothesis that a user seeks to confirm. Laboratory technicians are the backbone of a scientific research lab. Their work is almost entirely laboratory-based and technicians may work alone or as part of a team of scientific staff. They can work in most areas of science including forensics, health and manufacturing. Typical responsibilities of a lab technician include

- conducting and supporting scientific investigation and experiments
- planning, setting up and undertaking controlled experiments and traits
- recording and analyzing data
- demonstrating procedures
- collecting, preparing and/or testing samples
- maintaining, calibration, cleaning and testing sterility of the equipments
- providing technical support
- presenting results of senior staff
- writing reports, review and summaries
- keeping up to date with relevant scientific and technical development
- supervising staff
- carrying out risk assessments

The area a laboratory technician works in will largely dictate the work they do. if they are in mining environmental, the might be analyzing laboratory conducting and examining mineral.

1.1.Job Specification:- Also known as employee specifications, a job specification is a written statement of educational qualifications, specific qualities, level of experience, physical, emotional, technical and communication skills required to perform a job, responsibilities involved in a job and other unusual sensory demands. It also includes general health, mental health, intelligence, aptitude, memory, judgment, leadership skills, emotional ability, adaptability, flexibility, values and ethics, manners and creativity, etc

1.2.Purpose of Job Description The main purpose of job description is to collect job-related data in order to advertise for a particular job. It helps in attracting, targeting, recruiting and selecting the right candidate for the right job. It is done to determine what needs to be delivered in a particular job. It clarifies what employees are supposed to do if selected for that particular job opening. It gives recruiting staff a clear view what kind of candidate is required by a particular department or division to perform a specific task or job It also clarifies who will report to whom**.**

Self check 1	Written test

Name _____ **Date**_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 say true or false the following questions

_____1. The main purpose of job description is to collect job-related data in order to advertise for a particular job

_____2. The area a laboratory technician works in will largely dictate the work they do

_____3. One of recording and analyzing data is typical responsibilities of a lab technician

_____4. Laboratory technicians are the backbone of a scientific research lab

Note: **Satisfactory rating - 2 points** **Unsatisfactory - below 2 points**

Score = _____

Rating: _____

Information Sheet-2	Identifying standards of work, finishes and tolerances from the laboratory specification

2.laboratory standard work:- Laboratory Safety OSHA Laboratory Standard. OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories standard, referred to as the Laboratory standard, covers laboratories where chemical manipulation generally involves small amounts of a limited variety of chemicals.

2.1.laboratory standards In analytical chemistry, a standard solution is a solution containing a precisely known concentration of an element or a substance. A known weight of solute is dissolved to make a specific volume. It is prepared using a standard substance, such as a primary standard.

2.2.Function of laboratory basically, the function of such a laboratory is to make molecules (aka synthesis), and to find new efficient ways to make molecules (aka methodology). For methodology, the goal is to find new reactions or new reagents that will allow synthetic chemists to make molecules.

2.3.Quality standards:- are an integral part of the quality system. They are designed to help laboratories meet regulatory requirements, including local health regulations, and monitor laboratory functions, thereby ensuring laboratory safety and consistency of performance. in the other hand Quality standards are defined as documents that provide requirements, specifications, guidelines, or characteristics that can be used consistently to ensure that materials, products, processes, and services are fit for their purpose

2.4.Testing and calibration laboratories General requirements for the competence of testing and calibration laboratories is the main ISO standard used by testing and calibration laboratories. In most countries, ISO/IEC 17025 is the standard for which most labs must hold accreditation in order to be deemed technically competent.

2.5. Quality control (**QC**) is one of the most important impacts on laboratory testing—it ensures both precision and accuracy of patient sample results. ... When quality control works effectively, it is able to find and correct flaws in the analytical processes of a lab before potentially incorrect patient results are released.

- What information must a SDS contain?
- The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical.
- What are quality standards?

Self check 2	Written test

Name _____ Date_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 define the following questions

1. What is quality standards in mining laboratory?/2.5points/
2. What is laboratory standards in mining laboratory?/2.5 points/

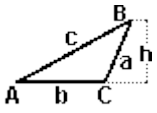
Note: **Satisfactory rating - 2.5 points** **Unsatisfactory - below 2.5 points**

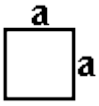
Score = _____

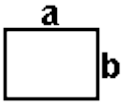
Rating: _____

Information Sheet-3	Basic calculations of weight, volumes &percentage

3.1Area:- is measured in square units such as square inches, square feet or square meters. To find the area of a rectangle, multiply the length by the width. The formula is: A = L * W where A is the area, L is the length, W is the width, and * means multiply. Area refers to the two-dimensional surface measurement of an object while volume refers to the three-dimensional special measurement of an object. Units will always be squared for area while units will always be cubed for volume.

Different shapes of Areas triangle = (1/2) b h 

square = a^2 

rectangle = ab 

circle = *pi* r^2 

3.2Volume:- is measured in "cubic" units. The volume of a figure is the number of cubes required to fill it completely, like blocks in a box. Volume of a cube = side times side times side. Since each side of a square is the same, it can simply be the length of one side cubed.

3.2.1Volume of a box, simply multiply length, width, and height - and you're good to go! For example, if a box is 5x7x2 cm, then the volume of a box is 70 cubic centimeters. For dimensions that are relatively small whole numbers, calculating volume by hand is easy.

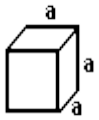
Remember that perimeter means the distance around a shape. Remember that area is the size of the surface of a shape, and that area is measured in square units. Remember that volume is the amount of 3D space which a shape occupies, and that volume is measured in cubic units.

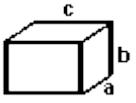
3.2.2.Volume of Prisms and Cylinders the basic formula can be extended to cover the volume of cylinders and prisms too. instead of rectangular end, you simply have another shape a circle for cylinders, triangle, hexagonal or indeed any other polygon for a prism effectively for cylinders and prism, the volume is the area of one side multiplied by the depth or height of the shape

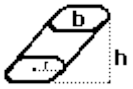
Formula of volume = $\pi r^2 h$

where: π is Pi, approximately 3.142 r = is the radius of the circular end of the cylinder h = height of the cylinder

Different shapes Volumes

cube = a^3 

rectangular prism = a b c 

cylinder = **b** h = πr^2 h 

sphere = (4/3) πr^3 

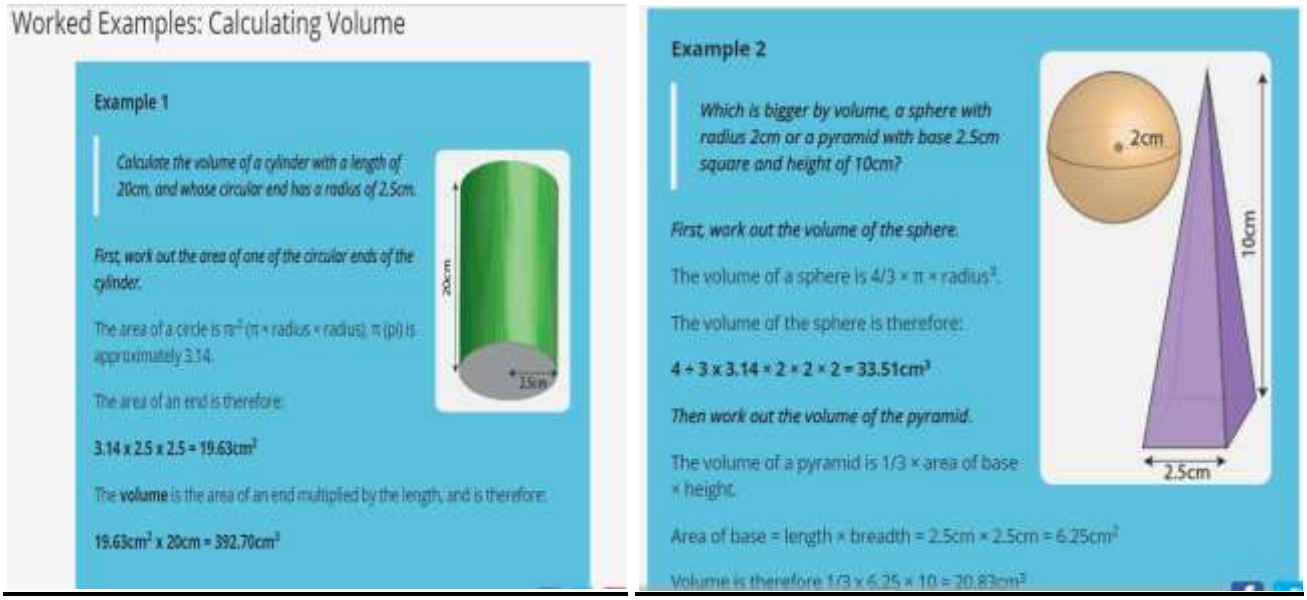


fig 3.1

3.3 Weight of the mass:- Weight is the sum of the atomic weights for the atoms in the chemical formula in the other hand weight is equal to mass of object times acceleration of gravity.

weight w =mg

For example determine the mass of the water that has left the compound

mass of water = mass of hydrate - mass of anhydrate

3.4.Percentage:- Divide the percentage that you want to find by 100 to convert it to a decimal. For example, if you want to find 28 percent, you would divide 28 percent by 100 to get 0.28. Multiply the percentage expressed as a decimal by the total to find the amount that corresponds to the total

If you want to know what percent A is of B, you simple divide A by B, then take that number and move the decimal place two spaces to the right. That's your percentage! To use the calculator, enter two numbers to calculate the percentage the first is of the second by clicking Calculate Percentage.

Percentage Difference Formula: Percentage difference equals the absolute value of the change in value, divided by the average of the 2 numbers, all multiplied by 100.

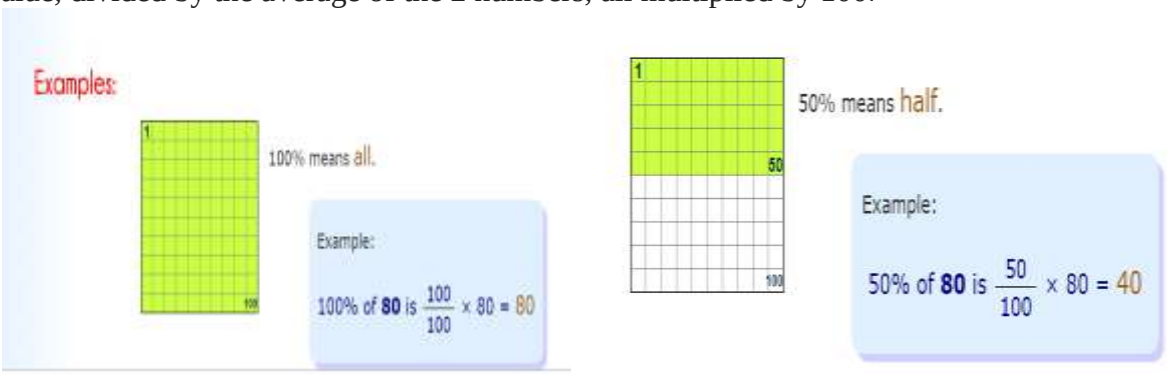


fig 3.2

Self check 3	Written test

Name _____ Date_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 work out the following questions

1. Calculate volume of the cylinder when the radius is 4cm and height is 4 cm./4points/
2. Calculate area of the cube when length is 4cm and 4cm height. /3points/
3. Calculate 40% 80 is 100 means full. /3points/

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6points**

Score = _____

Rating: _____

Information Sheet-4	Identifying material attributes from specifications

4.Introduction Critical Quality Attributes (CQA) A physical, chemical, biological, or microbiological property or characteristic that should be within an appropriate limit, range, or distribution to ensure the desired product quality

4.1Critical Process Parameter (CPP) A process parameter whose variability has an impact on a CQA and therefore should be monitored or controlled to ensure the process produces the desired quality of mining laboratory.

4.2Critical Material Attribute (CMA) A physical, chemical, biological or microbiological property or characteristic of an input material that should be within an appropriate limit, range, or distribution to ensure the desired quality of output material.

Once potentially high risk variables are identified:

- Identify levels or ranges of these potentially high risk attributes and/or parameters.
- Design and conduct experiments appropriate.
- Analyze the experimental data to determine if a material attribute or process parameter is critical. If variability has an impact, then need to monitor and/or control
- Develop a control strategy

Systematic approach, begin with the end in mind

- Identify CQAs based on patient's needs: safety and efficacy
- Use science- and risk-based approach to identify material attributes and/or process

Parameters that may impact CQAs

- Prioritize development studies and focus on the vital few potentially high risk material attributes and process parameters
- Establish an appropriate control strategy
- Consider discussing lifecycle management plans

4.3 Impact on Post-Approval Changes

Level 1: flexible input material attributes and process parameters; real-time automatic controls assure that CQAs consistently conform to the established acceptance criteria

Level 2: flexible material attributes and process parameters within the established design space

Level 3: any significant change in these MAs and PPs warrants regulatory oversight

Example Approach to Identify Material Attributes and Process Parameters

step 1. identify mineral product in laboratory

step 2. for each laboratory process step identify intermediate attributes that impact mining product attributes

step 3. identify material attributes and process parameters that may impact the intermediate of the process.

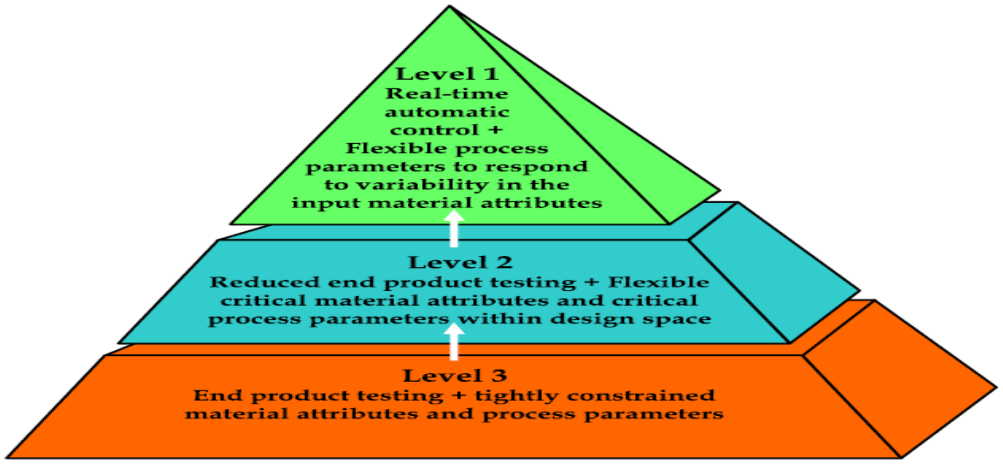


fig 4.1 Approach to Identify Material Attributes and Process Parameters

Self check 4	Written test

Name _____ **Date**_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 define the following questions each 5 points

1. write the difference between critical material attribute and critical process parameter.
2. write Example Approach to Identify Material Attributes and Process Parameters.

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6points**

Score = _____

Rating: _____

List of reference

1. safety and health in open cast mines international labor office Geneva
2. Draft code of practice on safety and health in opencast mines (Geneva, 16–20 October 2017)

3. www.resourcesandenergy.nsw.gov.au/safety

4. WA Department of Mines and Petroleum www.dmp.wa.gov.au

5. California Institute of Technology Laboratory and Workplace Safety Signs

6. U.S. Geological Survey www.usgs.gov

7.Energy Information Administration,U.S. Department of Energy www.eia.doe.gov

8.National Institute of Occupational Safety and Health www.cdc.gov/niosh/homepage.html

9.Mine Safety and Health Administration www.msha.gov

10.Society for Mining, Metallurgy, and Exploration, Inc. www.smenet.org

11.Office of Surface Mining,Department of the Interior www.osmre.gov