

Leather Processing Level II

Based on June 2021, Curriculum Version 1



Module Title: - Preparing Chemicals for Leather Processing

Module code: IND LEP2 M03 1221

Nominal duration: 30 Hour

Prepared by: Ministry of Labor and Skill

**August, 2022
Bahir Dar, Ethiopia**

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Acknowledgment

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Acronym

1. BCS - Basic Chromium Sulphate
2. MSDS - Material Safety Data Sheet
3. PEL - Permissible exposure levels
4. °C – Degree centigrade
5. °Be- Degree Baume
6. PPE - Personal Protective Equipment
7. PVC – Polyvinyl chloride

Introduction to the Module

In Leather processing; Preparing Chemicals for Leather Processing helps to enable users to understand Pre-preparation tasks, chemicals and equipment preparation, store unused chemicals, clean and store equipment and dispose wastes to handle chemicals, certain terms, which are used frequently in handling of chemicals. When a worker is exposed to any chemical it can have a significant bearing on the health and wellbeing of that worker and the environment. All chemicals are toxic at some concentration or dosage. For example, a few amount of chemical cause death while other chemical will produce same effect only after a large quantity has been consumed.

This module is designed to meet the industry requirement under the leather processing occupational standard, particularly for the unit of competency: **Preparing Chemicals for Leather Processing.**

This module covers the units:

- Pre-preparation tasks
- Chemicals and equipment Preparation
- Store unused chemicals
- Clean and Store equipment and dispose wastes

Learning Objective of the Module

- Confirm pre-preparation tasks
- Prepare chemicals and equipment
- Store unused chemicals
- Clean and Store equipment and dispose wastes

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Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of unit and
5. Read the identified reference book for Examples and exercise

Unit one: Confirm pre-preparation tasks

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying work instruction and process recipe
- Identifying chemicals and equipment

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify work instruction and process recipe
- Identify chemicals and equipment

1.1 Identifying work instruction and process recipe

Introduction

Out of the 5-7 million known chemical substances, more than 100,000 chemicals are used by industries in their production processes and operations. It is estimated that around 8,000 commercial chemicals are hazardous. Chemicals are extensively used in leather manufacturing process. About 250 different types of chemicals, chemical products and auxiliaries are used in the leather manufacturing process like common salt, lime, Sodium sulphide, Basic Chromium Sulphate (BCS), syntans, dye and fatliquors. However, most of the chemicals and auxiliaries used in leather process are found as hazardous/toxic. Tannery employees or workers are exposed to these chemicals in the following ways (Guidelines on prevention and control of chemical hazardous);

i. Inhalation

The main route of entry of chemicals into the body is by inhalation. Harmful emissions enter human body when we inhale polluted air. Chemicals can be inhaled into the human body in the form of dust, gases or fumes from leather manufacturing processes. For example, Fumes from acid and Ammonia solution, Dust from buffing operation, etc.,

ii. Ingestion

Ingestion of chemicals may occur as a result of poor personal hygiene. Examples are eating or drinking with hands that are contaminated with chemicals or taking meals in a tannery or chemical storage room. (E.g., Basic Chromium sulphate)

iii. Skin absorption

Direct contact of the skin with certain chemicals like sulphuric acid, Formic acid, hydrogen sulphide may result in primarily irritation or sensitization reaction similar to an allergic type of response. However, some chemicals can penetrate through the skin, and enter the bloodstream.

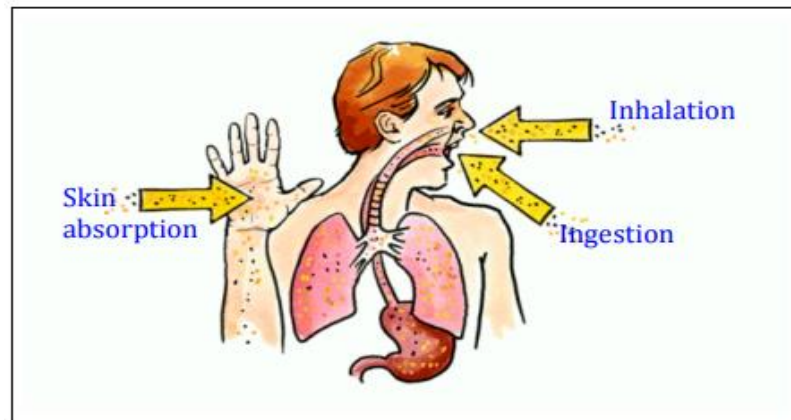


Fig.1.1: exposed to chemicals

Everyone who works with chemicals in tannery should know how to identify the chemicals and handling of it to minimize the exposure and risk level. So, the handling of chemicals is our responsibility because we are working with materials that are extremely toxic or hazardous to us. Therefore, every worker or employee should have basic knowledge of handling the chemicals they use. This information sheet serves to enable users to understand the handling of the chemicals

1.1.1 Identifying work instruction

A) Material Safety Data Sheet (MSDS)

A Material Safety Data Sheet (MSDS) is a document that details information about chemical, its properties and, most importantly, how it should be used and handled safely.

Elements of Material Safety Data Sheet (MSDS)

i. Identification of chemical

- Product name or common name
- Chemical name and formula
- Details of Manufacturer's

ii. Physical and chemical characteristics

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- Appearance
- Odour
- Boiling and Melting points
- pH
- Solubility
- Fire and explosion data (i.e., flash point, Flammable temperature etc.,)
- Others (Viscosity, vapor density)

iii. Chemical Hazards

- Flammability
- Explosiveness
- Reactivity

iv. Health hazards

- Toxins (i.e., carcinogens, teratogens, mutagens. etc.,)
- Irritants

v. Toxicological information

- Routes of entry
- Acute effects
- Chronic effects
- Toxicity ratings (e.g., LD50, LC50)
- Permissible exposure levels (e.g., PEL, TLV)

vi. First-aid measures

vii. Spillage, accidental release measures

viii. Disposal information's

ix. Transport information

Information from the MSDS should be used to create safe working procedures. These procedures should be available at the work place. The aim is to provide useful, understandable information to the workers, in order to create a safe working environment. Do not use new chemicals until information on them, as outlined above, is obtained.

Table 1: Information's included in material safety data sheet

NFPA Classification		DOT / TDG Pictograms	WHMIS Classification	HMS:	PROTECTIVE CLOTHING			
Health Flammability Specific Hazard				Health Flammability Reactivity PPE				
Section I. Chemical Product and Company Identification								
PRODUCT NAME / TRADE NAME: Ammonium Sulfate, Granular Grades								
SYNONYM: This Material Safety Data Sheet applies to the following Agrum products: 20-0-0-24 Granular Ammonium Sulfate 20-5-0-24 Granular Ammonium Sulfate 21-0-0-24 Granular Ammonium Sulfate			MSDS NUMBER: 1600H					
CHEMICAL NAME: Ammonium sulfate			REVISION NUMBER: 1.0					
CHEMICAL FAMILY: Ammonium salt			MSDS prepared by: the Environment, Health and Safety Department on:					
CHEMICAL FORMULA: (NH ₄) ₂ SO ₄			24 HR EMERGENCY TELEPHONE NUMBER: Transportation: 1-800-768-6311 Medical: 1-888-477-0123					
MATERIAL USES: Agricultural industry: Fertilizer. Industrial applications: Manufacture of specialty fertilizers.								
MANUFACTURER: Various		SUPPLIER: Agrum North American Wholesale 13131 Lake Fraser Drive, S.E. Calgary, Alberta, Canada, T2J 7E8 Agrum U.S. Inc. Suite 1700, 4562 South Ulster St. Denver, Colorado, U.S.A., 80237						
Section II. Hazardous Ingredients								
		Exposure Limits (ACGIH)						
NAME	CAS #	TLV-TWA mg/m ³	TLV-TWA ppm	STEL mg/m ³	STEL ppm	CEIL mg/m ³	CEIL ppm	% by Weight
Ammonium sulfate	37788-20-2	N/A						>99
ACGIH TLV notations: --- the assigned TLV (C) - Ceiling - the concentration not to be exceeded at any time (T) - measured as the time-weighted average of the second (S) - measured as the short-term exposure limit of the second (ST) - measured as the Threshold Limit Value of the second								
TOXICOLOGICAL DATA ON INGREDIENTS: Ammonium Sulfate TPI Product Testing Program Results: Acute oral LD ₅₀ , rat: >2,000-4,200 mg/kg Acute oral LD ₅₀ , mouse: 1,640 mg/kg Acute dermal LD ₅₀ : >2,000 mg/kg (rat, mouse) Ecotoxicity: Acute toxicity to fish, Coho salmon, rainbow trout, largemouth bass, bluegill, fathead minnow, 24-96 hr LC ₅₀ : >90-1500 mg/L								
Continued on Next Page								

B) Labeling

Labeling is to enable users of chemicals know exactly what chemicals they are handling, the hazards involved and the precautionary measure taken. This identifies what the chemical is. The label will also identify any hazards associated with the use of that chemical.

These labels include:

- The trade name of the chemical
- The concentration (strength) of the chemical

- Hazard symbols
- Emergency information ("If accidentally swallowed...")
- The name of the manufacturer
- The date and identification of manufacture batch

Chemicals should not be brought into the tannery if they are not properly labeled or marked



Fig 1.2: Labeling of chemicals

1.1.2 Components of Process recipe/sheet

A process sheet is the document, which provides all the information of an entire process or part of the process of leather manufacturing. A process sheet essentially contains all the necessary details. The process sheet is the basic document with which the process can be carried out.

The following information's are provided in a process sheet.

- The overall process scheme (example: Raw to wet blue, raw to vegetable tanning, wet blue to finish, vegetable tanned leather to finished leather etc)
- The starting material (example: wet salted, dry salted, wet blue, vegetable tanned leather, crust etc)

- Then the process table, which may contain the name of the unit process. Under each unit process the following information are provided.
 - ✓ Name of the chemical, percentage of chemical, time of running the vessel such as drum / paddle and other process information (viz. loading / draining the drum or paddle, checking of pH, piling etc.)
 - ✓ In the case of mechanical operations, the operational requirement such as thickness in the case of splitting and shaving, grit size of buffing paper to be used in the case of buffing and snuffing etc.

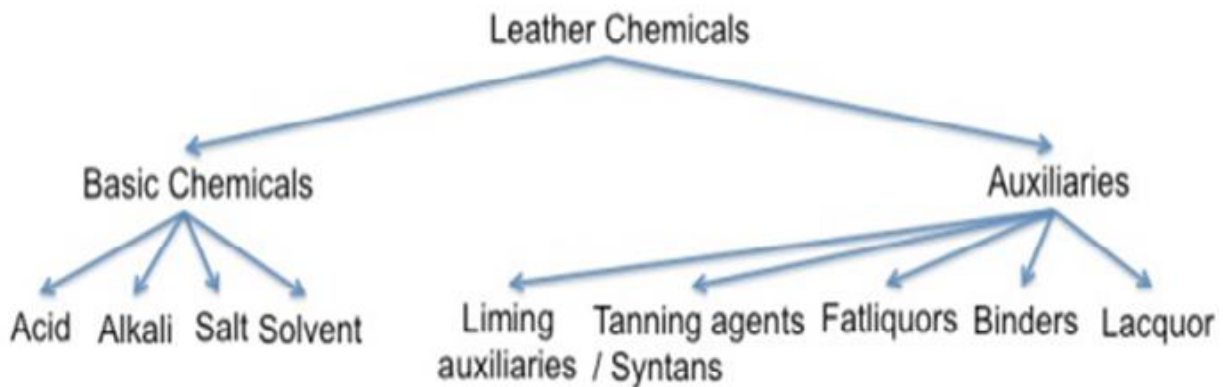
Table 2: Leather Process Sheet Template

Date: _____				Process type: _____			
Section/Yard: _____				Input Material: _____			
Batch No/Lot No: _____				No. of Pieces: _____			
Client: _____				Weight: _____			
Unit Operation	Chemicals	% Offer	Weight	Running Time		Controls T (°C)/ °Be	Remarks
				Start	End		

1.2 Identifying chemicals and equipment

1.2.1 Types of chemicals

The chemicals used for leather manufacturing can broadly be classified into basic chemicals and chemical products (also known as auxiliaries). The classification and types of chemicals are provided as illustration below:



In the bases of process, leather chemicals are also divided into three broad categories:

- i. Pre-tanning chemicals
- ii. Tanning chemicals
- iii. Finishing chemicals

1.2.2 Types of equipment

Equipment is an important part in preparation of chemicals for leather processing. Two types of equipment's are used for the chemical preparation.

- i. Measuring equipment
- ii. Weighing equipment (scale)
- iii. Funnel
- iv. Calculator
- v. Cleaning Materials

i. Measuring equipment

Chemicals often need to be measured accurately; otherwise, they may be influence the process, and can become a safety hazard.

Following are some measuring equipment used for chemical preparation

- ✓ Glassware's and plastic wares
- ✓ pH meter



Fig. 1.8: (a) Measuring jug (b) Beaker (c) Volumetric flask (d) Measuring cylinder

ii. Weighing equipment (scale)

Another common equipment found in tanneries is the weighing scale called as balance for the chemical preparation. Weighing is the determination of mass of chemical using a balance. Weighing is a frequent step in tannery operations, and the weighing scale/balance is an essential

piece of equipment. Balances of various kinds are used in the tannery based on the capacity and the accuracy of weighing.

Various types of weighing scales are introduced and these weighing machines are highly accurate, and it is possible to access the quantity of even minute things.

Different types of weighing scale which are commonly used



Fig. 1.9: (a) Top loading balance (b) Analytical balance

iii. Funnel

The Funnel is a piece of equipment that is used to target liquids into any container so they will not be lost or spilled. It has conical/wide mouth and narrow stem. There are different kinds of funnels like filter funnels and dropping funnels and made of stainless steel, aluminum, glass or plastic.



Fig. 1.10: filter funnel and dropping funnel

iv. Calculator

A calculator is a device that performs arithmetic operations on numbers. It is a mathematical device, which we give some input and getting some input which perform calculation. There are many varieties of calculators such as basic calculator and scientific calculators.







Fig. 1.11: scientific calculator

v. Cleaning Materials

Cleaning equipment's is essential for the efficient operation and safety in laboratories. Wash equipment as quickly as possible after use. It is important to maintain the safety of the lab environment, protect the equipment and instruments and prevent the contamination of on-going experiments. A range of materials is used for clean-up operations. Following are the most common types of materials used for cleanup the equipment's.

Table 3: cleaning materials and their uses

Materials	Figure	Uses
Detergents and Soaps		To remove the oils and grease contamination
Paper towels (Tissue Paper)		Used for wiping the equipment's, drying hands and cleaning up spills. It is disposable and intended to be used only once

Cleaning Brushes		Used effective cleaning of glassware with reduce scratching. It's come in a variety of shapes, sizes, handle design and bristle material.
Sponges		Used for cleaning impervious surfaces. They are especially good at absorbing water and water-based solutions.

Self-check-1

Directions: Answer all the questions listed below.

Test I: Short Answer

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers

1. What is the type of equipment majorly used for chemical preparation? (4 marks)
2. Write the elements of MSDS? (2 marks)
3. What is component of process sheet? (4 marks)
4. Write the classification of tannery chemicals based on chemical nature. (4 marks)
5. Give any two cleaning material and describe its use. (4 marks)

Test II: Multiple Choices

Directions:

Choose the correct answer for each question and write only the letter that corresponds to your answer. (2 Points each)

1. In one of the following employees of the Tannery are exposed to the chemicals by:
 - a) Inhalation
 - b) Ingestion
 - c) Skin absorption
 - d) all
2. One of the following is not an element of material safety data sheet (MSDS)
 - a) Chemical Hazards
 - b) Health hazards
 - c) First-aid measures
 - d) None
3. The components of process recipe/ sheet are:
 - a) overall process scheme
 - b) starting material
 - c) process control
 - d) all

Test III: Fill in the blank space

Directions: Write the appropriate answer for each questions in the provided blank space.

1. _____ is the document, which provides all the information of an entire process or part of the process of leather manufacturing.
2. _____ is to enable users of chemicals know exactly what chemicals they are handling, the hazards involved and the precautionary measure taken.
3. Leather processing chemicals are divided into_____, _____ and _____

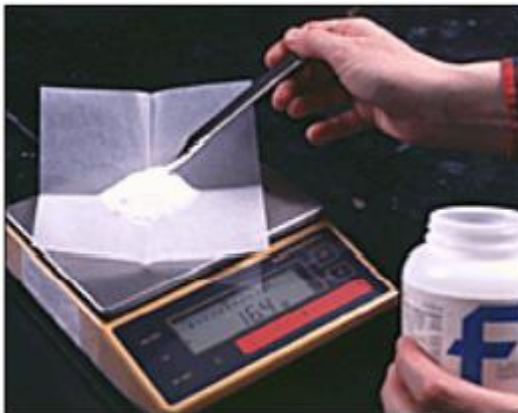
Operation Sheet — 1

Procedure for Weighing Materials in a Balance

- i. Check if the balance is turned on. If not, press the on/off button
- ii. Allow the scale to warm up and stabilize for 2 minutes before commencing the weighing function



- iii. Place the container on balance
- iv. TARE the balance to zero the balance



- v. Place the sample in container and note down the weight
- vi. Use the brush provided to clean any spills. Discard any disposable containers, weighing paper or Kim wipes in the nearest wastebasket



The procedure of weighing shown in the picture above is normally adopted for balances that are used for sample development processes in Tannery. In the cases of weighing bulk chemicals either gunny bags or bigger plastic buckets are used as containers, however the procedural steps are similar to as shown above

Benefits of using weighing scales

- Reduce the losses which happen due to weighing mistakes
- Capable to weigh chemicals in an accurate manner

Don't's

Don't move the weighing balance in any case.

Don't subject the table carrying weighing balance to severe vibrations or shocks, because it can affect the weighing operations.

Do's

- Clean the container and wipe down its outer surface before placing it on the weighing pan. Put off the fan in the vicinity of the instrument.
- Ensure that the instrument is not subjected to a draft of air.
- Do all the procedures carefully and ensure that weighing pan remains clean during the usage. Put off the ac power supply when you have finished your work

Unit Two: Prepare chemicals and equipment

This unit to provide you the necessary information regarding the following content coverage and topics:

- Organizing equipment and PPE
- Calculation and preparation of chemicals
- Handling of chemicals and materials

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Organize equipment and PPE
- Calculate and preparation of chemicals
- Safe handle of chemicals and materials

2.1 Organizing equipment and PPE

2.1.1 Organizing equipment

Equipment should also be checked regularly when it is in use, using documented procedures to show that the performance continues to be acceptable. The purpose of this procedure is to provide a checking equipment conditions for the all types of equipment for chemical preparation in tannery.

Checking of Glassware's

- Before each use the glass surface should be checked for damage such as scratches, cracks or chips. Damaged glass may not be used for safety reasons
- Vessels should only be used when they are in flawless condition, this is particularly important for work and under pressure or at high temperature

Checking the balances

Checking of Balance is not done before each weighing operation, errors can easily occur. Therefore, following procedures must be performed before the weighing the samples.

- i. Every day, check the accuracy of the scales on production lines and ingredient weigh-up area.
- ii. Zero the scale and then place standard weights (gms to Kgs) prescribed for the scale and record the reading.
- iii. If standard weight reading deviates the prescribed accuracy of the respective balance, then corrective action must be taken.
- iv. If the scale reads within the limits specified in step ii, then the scale passes and is fit for use.
- v. If the scale does not pass, make whatever corrective action is required (if necessary, refer to the manufacturer's manual to carry out the calibration procedure).

vi. Record the corrective action on the Daily Scales Calibration Check Form.

2.1.2 Organizing PPE

The Personal Protective Equipment (PPE) can be defined as all equipment which is intended to be worn or held by a person at work and which protects against one or more risks to their health or safety, e.g., safety helmets, gloves, eye protection, high visibility clothing, safety footwear, safety harnesses, etc

Personal protective equipment is the last line of defense a person has against a hazard that may be encountered on the job. The proper use of this equipment may reduce or eliminate the extent of harm or injury and therefore its importance must not be under-estimated. PPE is to be used as a control where hazards cannot be eliminated or adequately controlled by more effective control methods such as elimination, substitution, isolation, engineering or administration

A work area assessment is required to determine the potential hazardous and select the appropriate PPE for adequate protection. Review, Standard Operating Procedure (SOP), Material Safety Data Sheet (MSDS) of chemicals and other hazard information to determine appropriate PPE to wear based on chemical hazards encountered.

The following factors on the use of PPE should be adopted as a protocol:

- Properly assessed before use to make sure it is fit for purpose;
- Maintained and stored properly;
- Provided with instructions on how to use it safely;
- Used correctly by employee

Selection and use of PPE

When selecting PPE:

- Choose good quality products in accordance with the Personal Protective Equipment Regulations – suppliers can advise you;

- Choose equipment that suits the wearer – consider the size, fit and weight; you may need to consider the health of the wearer, eg. if equipment is very heavy, or wearers have pre-existing health issues, standard PPE may not be suitable;
- Let users help choose it; they will be more likely to use it.

Using and distributing PPE to your employers:

- Instruct and train people how to use it;
- Tell them why it is needed, when to use it and what their limitations are;
- Never allow exemptions for those jobs that ‘only take a few minutes’;
- If something changes on the job, check the PPE is still appropriate – speak with your supplier, explaining the job to them;
- If in doubt, seek further advice from a specialist adviser

Types of Personal Protective Equipment (PPE)

The most commonly needed personal protective equipment in tanneries and chemical storage are:

- i. Protective clothing (gloves, safety shoes/boots, aprons)
- ii. Hearing protection
- iii. Protective goggles and shields and
- iv. Respirators

Protective clothing

- Wear lab coats when hazardous chemicals are in use. Laboratory coats must be removed immediately upon discovery of significant contamination.
- Personal apparel: Wear long pants and shoes that completely cover the feet (having no or low heels). Loose clothing and long hair must be restrained.

- Wear appropriate chemical-protective clothing (i.e., aprons, oversleeves) when chemical contact to the body is anticipated or when extremely toxic or corrosive chemicals are handled (e.g., hydrochloric acid).



Fig. 2.1: Protective cloths

Hearing Protection

- Hearing protection is highly required during tannery operations and rarely required during laboratory operations
- Hearing protectors such as earmuffs or earplugs may be necessary to minimize noise exposures



Fig. 2.2: Ear protector

Respiratory protection

- Respiratory protection is not usually required during laboratory operations where work can be performed in a laboratory fume hood.
- If respirator use is required, users must receive a medical evaluation, be fitted, and trained for respirator use prior to using respirator protection.
- Respiratory protection is important while handling volatile chemicals / solvents



Fig. 2.3: Respiratory protective

Eye and Face protection:

All personnel shall wear the appropriate eye and face protection when involved in activities where there is the potential for eye and face injury from:

- Handling of hot solids and liquids
- Flying particles from shaving, cutting and buffing of leathers
- Repair or servicing of any machines
- Handling of chemicals and gases

Safety glass

- Ordinary prescription glasses do not provide adequate protection.
- Prescription safety glasses are recommended for employees who must routinely wear safety glasses in lieu of fitting safety glasses over their personal glasses.
- All safety glasses should have side shields
- Whenever protection against splashing is a concern, “chemical Splash Goggles” must be worn.

Goggles

- Goggles are intended for use when protection is needed against chemicals or particles
- Impact protection goggles, which contain perforations on the sides of goggle, are not to be used for chemical splash protection, therefore they are not recommended.
- Splash goggles, which contain shielded vents at the top of the goggle, are appropriate for chemical splash protection, and also provide limited eye impact protection. Goggles only protect the eyes, offering no protection for the face and neck.



Fig. 2.4: Eye google

2.2 Calculation and preparation of chemicals

2.2.1 Calculation of chemicals for the process

The chemicals are mostly offered in weight terms. Few chemicals are offered in volume terms. The chemicals to be offered are indicated in percentage based on weight of the raw material/starting material (such as wet-salted, fleshed pelt, pickled pelt, wet blue shaved weight and crust weight etc). The following equation is used for calculating the weight of chemicals based on skin weight.

Weight of the Chemical	=	% Of chemical given in process sheet	X	Weight of raw material/starting material
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Illustration 1

Calculate the weight of ammonium sulphate for deliming based on fleshed pelt weight.

Starting material: 3000 Kg of fleshed pelt

Unit process: Deliming

Chemicals to be offer: Water 100%

Ammonium sulphate 1.5%

Calculation:

Water: 100% of 3000 kg is $(1000/100) \times 3000 = 3000$ L

Ammonium Sulfate :1.5% of 3000 kg is $(1.5/100) \times 3000 = 45$ kg

Illustration 2

The volume/weight of the chemicals can also be calculated as given, Preparation of 1000 L finish mixture based on a recipe.

Recipe / process

Pigment : 120 gms

Soft binder : 100 gms

Calculation

For preparing 1000 L all the measures need to be multiplied by 1000 as follows.

Dye solution : 50 ml

Medium binder : 150 gms

Wax : 5 gms

Water : to make 1 L

Pigment : $120 \times 1000 \text{ gms} = 120000 \text{ gms} = 120 \text{ kg}$

Soft binder : $100 \times 1000 \text{ gms} = 100000 \text{ gms} = 100 \text{ kg}$

Dye solution : $50 \times 1000 \text{ ml} = 50000 \text{ ml} = 50 \text{ L}$

Medium binder : $150 \times 1000 \text{ gms} = 150000 \text{ gms} = 150 \text{ kg}$

Wax : $5 \times 1000 \text{ gms} = 5000 \text{ gms} = 5 \text{ kg}$

Water : to make $1 \times 1000 \text{ L} = 1000 \text{ L}$

2.2.2 Preparation of chemicals

Chemicals for leather processing are prepared based on the above illustrations by determining mass of chemical using a balance. Weighing is a frequent step in tannery operations, and the weighing scale/balance is an essential piece of equipment. Balances of various kinds are used in the tannery based on the capacity and the accuracy of weighing.

Lab experiments and leather processing often require preparation of chemical solutions in their procedure. Many experiments involving chemicals call for their use in solution form. That is, two or more substances are mixed together in known quantities. This may involve weighing a precise amount of dry material or measuring a precise amount of liquid. We look at preparation of these chemical solutions by weight (w/v) and by volume (v/v).

a. Using percentage by weight (w/v):

The formula for weight percent (w/v) is:

$$\% \text{ of w/v} = \frac{\text{Mass of solute (g)}}{\text{Volume of solution (ml)}} \times 100$$

Example:

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A 1.0% of Ammonium chloride solution has a 1.0 gram of ammonium chloride dissolved in 100 ml of solution.

Procedure:

Step 1: Weight 1 gram of ammonium chloride

Step 2: Pour it into a graduated cylinder containing water.

Step 3: Wait until dissolved completely, if necessary, swirl the flask gently

Step 4: Add water to bring the volume up to the final 100 ml.

b. Using percentage by volume (v/v)

When the solute is liquid, it is sometimes convenient to express the solution concentration as a volume percent.

The formula for volume percent is

$$\% \text{ of v/v} = \frac{\text{Volume of solute (ml)}}{\text{Volume of solution (ml)}} \times 100$$

Example: Make 100 ml of 10% of H₂SO₄ by volume solution in water

Procedure:

Step 1: Express the percent of solute as a decimal: 10% = 0.1

Step 2: Multiply the decimal by the total volume: 0.1 X 100 ml = 10 ml

Step 3: Take the 10 ml of H₂SO₄.

Step 4: Add water to bring the volume up to the final 100 ml.

Using percentage by weight (w/w)

In leather process, the following equation is used for calculating the weight of chemicals based on skin weight.

$$\text{Weight of the chemical} = \frac{\% \text{ Of chemical given in process sheet}}{100} \times \text{Weight of the raw material/Starting material}$$

Example: A 10% of sodium chloride to 5 kg of fleshed weight for pickling process

Procedure:

Step 1: Express the percent of chemical (NaCl) as a decimal: $10\% = 0.1$

Step 2: Multiply the decimal by the skin weight: $0.1 \times 5 \text{ Kg} = 0.5 \text{ kg}$.

Step 3: Take 0.5 Kg of NaCl for the pickling process.

2.3 Handling of Chemicals and Materials

2.3.1 Handling Chemicals

The following general recommendations must be taken into account for chemical handling in chemical storage and tannery (IUE, 2008)

Before using a chemical for the first time, carefully read the chemicals labels and Material Safety Data Sheet (MSDS). It is the best source of information about possible hazards, spill procedures, handling procedures and first aid for any substance



Fig. 2.5: Handling of chemicals

Do not work alone in the tannery and chemical storage. If you do need to work alone notify to the supervisor's or colleague's

- Keep your hands and face clean. Wash thoroughly with the soap and water after handling the chemicals. Always wash your hands after using chemicals before eating, smoking chewing gum or tobacco.
- Never eat, drink, smoke or chew gum or tobacco while handling the chemicals. Direct contact must be avoided with any chemicals



Fig. 2.6: Care to be taken for chemical handling

- Identify the chemicals carefully before use. Never use a chemical /auxiliaries that doesn't have a label. It may not be what you think it is. For identification, never smell or taste any chemical or chemical products
- Do not mix chemicals randomly and indiscriminately without specific authorization because incompatible chemicals produce toxic material



Fig. 2.7: Care to be taken for mixing of chemicals

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- Use only required chemicals (as mentioned in process sheet) for a particular process. Do not change or substitute. Use only the amount of chemicals needed for the immediate process at hand



Fig. 2.8: Measuring of chemicals for process

- When transporting chemicals between the storage and working area, use secondary containment (such as a tray, rack, cart or rubber carrier) to protect against spills, leaks or container breakage.



Fig. 2.9: chemical transportation in the working area

- Always return chemicals to their proper storage location after use. Never pour any chemicals down the sink.
- The quantity of chemicals in or at the work place should be restricted to that required for daily or batch use

- Cleanup should follow the completion of any operation or at the end of each day. Deposit wastes in appropriately labeled receptacles, and clearly mark temporary holding containers. Do not accumulate unneeded chemicals
- Any chemical spillage should be reported to the supervisors. Clean up the spills and leaks immediately to avoid exposing coworkers.
- For a large size tannery, all chemicals should be distributed from a gangway located over the beam house, tanning and post-tanning drums. The gangway should be equipped with adapted tanks connected to the drum axle.
- For a small size tannery, install a fixed funnel connected to the drum axle. Install steps to the funnel, which are not higher than 20 cm each. The upper edge of the funnel should not be higher than the hip of the worker when standing on the platform.

2.3.2 Handling of Materials

Proper methods of handling of materials protect against injury and makes work easier.






Aids of handling

Handling aids reduce the physical effort needed to lift and move objects, making it safer. When providing handling aids for the workplace.

It is important to ensure that: -

- The right equipment is selected for the task
- That all staff are trained in the correct use of the equipment
- The equipment is visually inspected for defects before use
- The wheels are suitable for the floor surface
- The wheels move freely
- The handle grips are comfortable and are in good order
- The handle height is between the waist and shoulder
- If they have brakes do they work?
- The aids are regularly inspected and maintained to ensure it is good working order
- The load secured before moving

Table 4: Aids of Material handling

Use hand Trolley to move bulk loads	
Use rolling platforms to assist in carrying and handling heavy objects where limited spaces does not allow for comfortable body position	
Use a shelf truck to move a variety of objects	
Use a semi-live skid for temporary storage of work	
Use stair climbing trolleys for stairs	

Following are the basics procedural steps of safe handling Material and goods.

- Size up the load and check overall conditions. Don't attempt the lift by yourself if the load appears to be too heavy or awkward. Check that there is enough space for movement, and that the footing is good. "Good housekeeping" ensures that you won't trip or stumble over an obstacle.

- Make certain that your balance is good. Feet should be shoulder width apart, with one foot beside and the other foot behind the object that is to be lifted. § Bend (he knees; don't stoop. Keep the back straight, but not vertical. (There is a difference. Tucking in the chin straightens the back.)
- Grip the load with the palms of your hands and your fingers. The palm grip is much more secure. Tuck in the chin again to make certain your back is straight before starting to lift.
- Use your body weight to start the load moving, and then lift by pushing up with the legs. This makes full use of the strongest set of muscles.
- Keep the arms and elbows close to the body while lifting.
- Carry the load close to the body. Don't twist your body while carrying the load. To change direction, shift your foot position and turn your whole body. Watch where you are going!
- To lower the object, bend the knees. Don't stoop. To deposit the load on a bench or shelf, place it on the edge and push it into position. Make sure your hands and feet are clear when placing the load.

Self-check-2

Instructions:

Test: Short Answer Question

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. Define PPE? (2 marks)
2. What is the main criteria for selection of PPE? (4 marks)
3. Write the types of PPE used in tannery? (4 marks)
4. Calculate the weight of sodium sulphide for prepare 10 % w/v solution to unhairing process? (2 marks)
5. Write the formula for calculating the chemicals weight based on process? (3 marks)

A weight of the raw cow hide for making leather is 15 kg. In liming process, 7% Lime and 2% sodium sulfide are used as given in process sheet.

6. Calculate the weight of the lime and sodium sulphide actually taken for liming process. (4 marks)
7. Calculate sodium chloride 10% and sulphuric acid 1.5% for pickling process the weight of pickled pelt is 1500 kg of hide processing? (5 marks)
8. Calculating the weight of chemicals for chrome tanning based on fleshed pelt weight as follows

Pelt weight: 2500 Kg

Pickled water : 50%

Chrome : 8%

Sod. Formate : 1%

Sod. Bicorb : 2%

9. What are the aids used for handling of materials? (5 marks)

Part II: Fill in blank space

1. _____ defined as all equipment which is intended to be worn or held by a person at work and which protects against one or more risks to their health or safety.
2. _____ are reduce the physical effort needed to lift and move objects, making it safer.
3. Chemicals for process and laboratory tests are prepared by _____ and _____.

Lap Test-2

Name..... ID.....

Date.....

Time started: _____ Time finished: _____

Instructions:

Given necessary raw materials, tools, you are required to perform the following tasks within 3 hours.

Task 1: Determine the right PPE equipment for the preparation of chemicals

Task 2: Calculate the chemical requirement for the given process sheet

Task 3: Preparation of chemicals after weighing and measuring chemicals as per process sheet

Request your teacher for evaluation and feedback of your work

Unit Three: Store unused chemicals

This unit to provide you the necessary information regarding the following content coverage and topics:

- Repacking unused chemicals
- Storage of unused chemicals
- Recording chemical consumption

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Repack unused chemicals
- Store of unused chemicals
- Record chemical consumption

3.1 Repacking unused chemicals

Unused chemical requires special handling, management practices and disposal. An unused chemical can be a chemical in its original container, either opened or unopened. It can be a reaction by-product, mixtures, basic chemicals like acid and alkali or solvents. These chemicals become a “waste” when it has no further economic value regardless of whether or not it has been used or contaminated. Each laboratory worker is responsible for ensuring that unused chemicals are handled in a manner that minimizes personal exposure and the potential for environmental contamination. The purpose of this information sheet is to provide guidance for the segregation and packing of unused chemicals in tannery laboratory, which is also applicable for the chemical store unit of production yards in tannery.

3.1.1 Segregation

Unused/unwanted chemicals products should be collected separately.



Fig. 3.1: chemical segregation

Unused/unwanted chemicals should be remaining in their original containers unless the containers damaged.

Unused chemicals should be collected in separate containers by categories segregated.

These categories of chemicals to be dealt include but not necessarily limited to:

- | | |
|---------------------------------------|----------------------|
| a. Fatliquors, wetting agent and oils | e. Solvents |
| b. Acids | f. Dyes and |
| c. Lime, soda ash, sodium sulphide | g. Lacquers, Binders |
| d. Tanning chemicals | |

3.1.2 Containers of unused chemicals

Containers refer to anything that serves as a primary container or as an outer or secondary package over a primary container. For collection of the chemical, selection of the containers is very significant. Hereunder, some of the important points are given.

- Unused chemicals must be stored in containers with lids composed of materials that are compatible with the chemicals. For example, strong acids should not be stored in plastic bottles.
- Containers must be in good condition, free of leaks, and no residue on the outside of the container.
- Empty containers in which the product was originally received are best reused as collecting/storing containers after adequate cleaning.
- All containers must have tightly fitting caps and be kept closed at all times except when waste is actually being added



Fig. 3.2: Container of chemicals

- Plastic bags must have no punctures or tears, be tightly sealed and placed in a secondary container such as double-bagged or boxed.

- Glass containers should not exceed one gallon (4 liters) in size and not be filled into the neck of the fill/pour spout.
- Metal or plastic containers should not exceed five gallons (20 liters) and not be filled into the neck of the fill/pour spout.
- Containers that were designed for solid chemicals should not be used for liquids.
- Liquid levels in flat-top containers must be at least one inch from the top of the container.
- Following are examples of acceptable containers:
 - ✓ Any steel, plastic or fiber pack drum
 - ✓ Metal cans or pails
 - ✓ Steel cylinders and tanks
 - ✓ Paper or plastic bags
 - ✓ Glass and plastic bottles, jars, vials, and carboys
 - ✓ Cardboard boxes
 - ✓ Mercury flasks



Fig 3.3: Types of container for chemicals

3.1.3 Packaging of unused chemicals

- Packaging should be done to minimize the possibility of breakage or leakage during handling
- Chemical waste containers must be tightly closed to prevent leakage or spillage. Containers should be closed with a screw-type lid or other appropriate device. Plastic wrap, aluminum foil, parafilm and other make-shift lids are unacceptable

- Do not overfill liquid containers. To minimize spillage, allow enough air space for expansion.
- Multiple containers of compatible chemicals may be placed in a cardboard box. Ensure containers are sealed before placed.
- The space between the containers/bottles should be filled with a cushioning material to prevent breakage handling (foam peanuts, newspaper, vermiculite)
- Paper or cardboard primary containers should be put into sealed plastic bags
- Liquid containers must be less than 5 gallons and weigh less than 45 pounds.
- Chemicals should not be place in biological waste containers (bags, boxes, etc.)
- Attach a chemical waste label on the outside of the box along with a completed packing list
- Boxes exceeding 45 pounds or 18 inches on a side cannot be safely handled by one person, and will not be picked up



Fig. 3.4: Packing of chemicals

3.1.4 Labeling of unused chemicals

All chemical containers must be labeled to ensure safety, to prevent waste from becoming an unknown, for regulatory compliances, and to improve the efficiency of handling. Container labels must be compatible with the chemical waste. It also should provide information about constituents and approximate volume in the container. Unused chemicals in their original containers do not need additional labeling. In case of storing other chemicals, deface or remove any original labels remaining on the container to avoid confusion about identify of the chemicals. When reusing the empty bottles, the original label must be completely defaced.

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Label must include the following information:

- The common chemical name
- Quantity of material
- Name and contact details of person preparing the chemical for disposal
- Enter the date on the label when the container is filled.

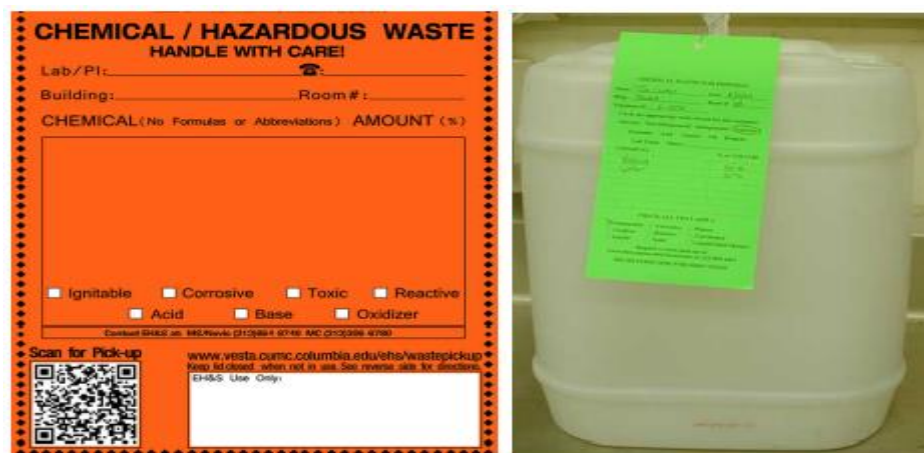


Fig. 3.5: Labeling of chemicals

Unknown chemicals should be determined; it may be possible to determine the identity by:

- Reviewing past and current projects being worked on in the laboratory
- Asking questions to co-workers
- Identifying the pH
- Contacting EH&S for assistance with identification

Some of the important points about labeling are here under:

- All unused chemicals in original non-leaking containers with manufacturer's label should be accepted as is.
- Labels should be affixed in a manner that does not cover existing labels or markings.
- Solvent labels should preferably be put onto string tags attached to containers.

3.2 Storage of Unused Chemicals

Chemical wastes, out of date chemical and unwanted/unused chemicals require special handling, storage and appropriate disposal. Storing of unused chemicals is mainly based on the type of material. Unused chemical containers must be stored in the room it was generated in and cannot

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be transferred to any other area. Chemical waste must be stored with secondary containment so that spills cannot reach sinks, or floor drains. Incompatible chemical wastes must be segregated to prevent reaction.

Some of the important points are here under:

- Chemicals must not be stored more than 5 gallons (20 liters) in a single container
- Never store flammables with oxidizers or acids with caustics.
- Labs must use bins for segregation and secondary containment
- Flammable chemicals are best stored in a fire rated cabinet.

i. Storage conditions

To get the most suitable conditions for storage, we should ensure that following important points:

- The surrounding land around a storage site is cleared of vegetation and rubbish to minimize the risk of fire.
- The storage area should be separated from people and watercourses and above flood height
- There should be good security procedures to prevent any unauthorized access
- There is a good access point and an easy exit
- Access to emergency equipment (e.g. fire extinguishers) is unblocked
- Adequate space is available for racks and separation of incompatible chemicals
- Protected from direct sunlight
- Appropriate shelving to minimize breakages
- A bund (a wall around chemicals to contain potential spills) is present, in the case of liquids
- Adequately supplied with water for washing
- Separate from office or other work areas
- Constructed of non-combustible materials
- Good natural ventilation
- Equipped with flameproof electrical equipment.



Fig. 3.6: Bad storage condition of chemicals

ii. Handling of unused chemicals

When handling chemicals, you should take the following precautions:

- Avoid contact with chemical or inhaling vapor. Do not eat, drink or smoke in the chemical storage area
- Wear PVC gloves when handling containers. Take care when removing protective clothing and ensure your skin doesn't come in contact with contaminated surfaces.
- Wash hands immediately after handling containers, with soap and warm water
- Immediately attend to any cuts or abrasions incurred while handling chemicals
- Wash protective equipment after every use and store in clean, dry and hygienic conditions



- Ensure to launder lightly soiled clothing separately from other items and store contaminated clothing for disposal
- Laboratories should try to minimize storage of chemical waste and not accumulate waste after filling.

As part of the chemicals handling in laboratory, keeping records of consumed chemicals. There are many good reasons for keeping consumed chemical records. They provide useful data that can be used to assist chemical users with their business and to demonstrate that due care has been taken with the application of chemicals.

3.3 Recording chemical consumption

Components of record book

A bound book used to record used chemicals carried out in the laboratory. This book is called logbook or chemical logbook. Divide the pages of the chemicals logbook into columns with the following headers:

- Name of chemicals
- Name of user
- Amount of chemicals used
- Name of the experiment use
- Date out
- Signature

Features of recording

- An important feature of this record is that it must be readily available to all the person.
- The workplace manager is to ensure that all chemicals and hazardous substances stored in the workplace are entered into a chemical register.
- The chemical register is to be kept up to date and reviewed when hazardous are identified, risk controls are changed or chemicals availability in the workplace/laboratory.

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Benefits

The benefits of the recording used chemicals are:

- Tracking of scheduled chemicals
- Purchase avoidance
- Reduction in disposal costs
- Avoidance of potentially hazardous chemical stockpiling

Templates for monitoring chemical consumption

Different category of chemicals used in tannery is mentioned below. Standard templates are to be prepared for monitoring the amount of different category chemicals used in a tannery. Templates for monitoring daily consumption and weekly consumption would provide information on the requirement of the chemicals required for running the tannery smoothly with optimal stock. Some templates for recording the usage of beam house and tanning chemical on daily and weekly basis are provided in this section and these are only sample templates and not universal standards. Similar formats can be used for monitoring other chemicals used in tannery.

Categorization of Chemicals

- Beamhouse
- Tanning
- Post tanning
 - ✓ Syntans
 - ✓ Fatliquors
 - ✓ Dyes
- Finishing
 - ✓ Pigments
 - ✓ Binders
 - ✓ Lacquer emulsions
 - ✓ Other Auxiliaries
- Other Bulk Chemicals

Table 5: Template for monitoring Daily/weekly consumption of Beam house chemicals

Date: _____						
S.No	Chemicals	Lot No				Weight (K)
1	Wetting agent					

2	Lime					
3	Sod.silcoflouride					
4	Soda ash					
5	Sod. Sulphide					
6	Sod. sulphydrate					

Table 6: Template for monitoring Daily/weekly consumption of chemicals used for deliming, pickling and Tanning

Date: _____						
S.No	Chemicals	Lot No				Weight (K
1	Ammonium sulphate					
2	Deliming agent					
3	Degreasing agent					
4	Bating enzyme					
5	Salt					
6	Formic acid					
7	Sulphuric acid					
8	Chrome					
9	Sodium formate					
10	Sodium bicarbonate					
11	Fungicides					

Self-Check — 3

Instructions:

Test I: Short Answer Question

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. How will you segregate the unused tannery chemicals? (5 marks)
2. What is the selection criteria of container for storage of unwanted solid chemicals? (5 marks)
3. Write the elements of Label for unused chemical storage? (5 marks)
4. What are the requirements for packaging the unwanted chemicals? (5 marks)
- 3 Write the suitable storage conditions of packed chemicals for dispose? (5 marks)
- 4 What are the precautions you take while handling the unwanted chemicals? (5 marks)
- 5 What is the benefits of recording of used chemicals? (5 marks)

Test II: Fill the blank space

Directions:

Write the appropriate answer for each questions in the provided blank space.

1. _____ is done to minimize the possibility of breakage or leakage of chemicals during handling
2. Storing of unused chemicals is mainly based on the type of _____.
3. Templates for monitoring daily and weekly consumption would provide information on the requirement of the chemicals required for running the tannery smoothly with _____.

LAP Test

Practical Exercise

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

You are provided with a chemical container having unused chemicals left in it; you should label this container appropriately (30 min).

Request your teacher for evaluation and feedback of your work

Unit Four: Clean and Store equipment and dispose wastes

This unit to provide you the necessary information regarding the following content coverage and topics:

- Cleaning equipment and workplace
- Handling and storing equipment
- Waste disposal

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Clean equipment and workplace
- Handle and storing equipment
- Dispose Waste

4.1 Cleaning equipment and workplace

4.1.1 Cleaning the Equipment

Tannery equipment has to be cleaned and properly stored so that the possibility of contamination is minimized. If any equipment has significant chemical contamination on the outside surface it would present a hazard to anyone handling it. Proper maintenance of equipment is a key ingredient to its performance and reliability. It is important to clean the equipment periodically. Check the manufacturers product information for recommendations on a schedule for cleaning the equipment. Generally, the external surfaces of equipment should be cleaned daily. Spills in or on the equipment should be cleaned immediately. To prepare chemicals in Leather manufacture containers including glassware and equipment such as weighing balance, pH meter, thermometer and conductivity meter are to be cleaned. Weighing balance is an important equipment with reference to the preparation of chemicals for leather manufacture. Following are some guidelines for cleaning the glassware and equipment.

Cleaning Weighing Balance

- If chemicals are spilled during weighing, sweep out all of the spilled material from the balance pan.
- Mop up any split liquids and brush any split chemicals from the weighing chamber.
- In the case of laboratory and analytical balances clean the glass doors using a soft and 80% v/v ethanol.
- Remove dust from the exterior of the cabinet and clean up any split chemicals from the balance bench area.

Cleaning containers

- All containers must be thoroughly cleaned after its use for preparing the chemicals used for leather manufacture.
- All glassware must be thoroughly cleaned after its use.

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- First, glassware should be rinsed with water and immediately place in a large plastic measuring cylinder full of water
- Then soaked in a weak detergent solution for 2-3 hours.
- If you use brushes for cleaning glassware, make sure the metal part of the brush does not scratch the glass.
- Rinse with tap water. Glassware requiring occasional acid rinsing should be segregated from general use glassware.
- Be sure to rinse the glassware well. It is good practice to rinse the glassware with distilled water and then let it drain to dry.
- For dirty glassware, put in cylinder filled with chromate solutions and leave overnight.
- Ultrasonic cleaners can often help clean dirt out of small crevices
- Finally, dry in an oven at 60 °C, or in incubator.

Cleaning of the pH meter

To ensure accurate and reliable analytical measurements, a routine care and maintenance regime should be adopted. In addition to giving the correct measurement result the correct care and maintenance of pH electrodes will result in improved electrode performance and prolonged working life. During use, electrodes can suffer from contamination to the membrane and diaphragm, which will result in measurement errors or slow electrode response. Adopting a regular preventative maintenance procedure will help to reduce or eliminate these errors. The details of the maintenance steps to be taken, depends on the nature of the samples being measured. Given below are various cleaning procedures that can be employed as either a preventative or corrective action to maintain an electrodes performance or restore the performance of a poorly functioning electrode The type of cleaning required for pH meter electrodes depends of the type of contaminant affecting it. The most common procedures are summarized next:

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i. General cleaning.

- Wash with a solution of liquid detergent or enzymes detergent and warm water by gently scrubbing with a soft toothbrush or soft cloth. Follow with thorough rinse in distilled water or clean tap water.

ii. Inorganic Scale Deposits:

- Dissolve the deposit by immersing the sensor's measurement tip in a 0.1 M HCl solution or 0.1 M HNO₃, for 20 minutes
- Then, rinse with distilled water or clean tap water

iii. Removal of deposits and bacteria

- Soak the pH electrode in a diluted domestic bleach solution (e.g. 1%), for 10 minutes
- Rinse abundantly with water

iv. Cleaning oil and grease.

- Rinse the pH electrode with a mild detergent or with methyl alcohol.
- Rinse with water.

v. Cleaning of protein deposits.

- Soak the pH electrode in 1% pepsin and 0.1 M HCl for 5 minutes.
- Rinse with water. After carrying out each cleaning operation, rinse with deionized water and refill the reference electrode before use.

Cleaning thermometer

Before and after each use, clean the thermometer with a soft cloth and 70% isopropyl alcohol diluted with water, or wash with cold soapy water. An intact unit can be submersed in water or alcohol. However, do not soak for an extended period of time. The unit must never be sterilized

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by boiling, gas or steam autoclaves. A similar protocols of cleaning may be followed for other hydrometers such as **Barkometer** and **Baume** meter that are normally used to determine the specific gravity of solution in Tannery.

Cleaning conductivity electrodes

The conductivity cell does not age, but special measuring media (hydrofluoric acid) or excessively high temperatures shorten the lifetime. Thoroughly rinsing the probe with deionized water after each use and proper storage are the key factors to maintaining the cell. If the probe becomes contaminated, follow the external cleaning procedure below.

- For water soluble contaminants, rinse with deionized water
- For remove lubricants and oil contaminants, soak in warm water and liquid household detergent and rinse with deionized water or soak the probe in ethanol or acetone for 5 minute and rinse with deionized water
- For remove the lime or hydroxide coating, use 10% acetic acid or hydrochloric acid and rinse with water.

4.1.2 Cleaning Workplace

Cleaning workplace in a leather processing unit is involving basic cleaning tasks in beam house, post tanning and finishing yards. Efficiently managed housekeeping departments ensure the cleanliness, maintenance, and aesthetic appeal of the working area. Good housekeeping practices are based on common sense and involve little or no investment. Adopting these basic measures to conserve material, water, and energy can considerably enhance the productivity of an enterprise by reducing the costs of production. Minimizing, reusing, and recycling wastes and by-products prevent pollution at source where it is easier and less expensive to deal with than at the end-of-the-pipe.

Purpose of cleaning workplace

Clean work station is meant free of skin trimmings, hair, sludge, shaved wastes or any spillages etc is critical to maintaining a safe work environment. Housekeeping is a continual effort in

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leather industries. The proper management of routine tasks should be maintained at all times. Poor housekeeping affects all aspects of safety and can result in both minor and major incidents.

Who is responsible cleaning?

Housekeeping is the responsibility of all employees. Employees are responsible for their individual departments and any other locations they perform their duties. Supervisors are responsible for overseeing employees and ensuring that proper housekeeping is maintained. Aspects of proper housekeeping practices are outlined in all safety programs and trainings. This is a summary of the major housekeeping tasks that must be maintained on a regular basis.

Areas to be cleaned in a tannery Areas to be cleaned, including a range of different surfaces such as beam house, hide/skin storage places, tan-yard, post tanning and finishing departments and other departments of tanning industries that has a direct or indirect contact with workers and the environment around the industry. This may include waste generating process areas such as soaking, liming, fleshing, deliming, batting, degreasing, pickling, tanning, trimming, post tanning and finishing but not limited to these operations alone.



Figure 4.1: Cleaning of the floor

Procedure for cleaning and housekeeping

A clean place to work is necessary for safety. In order to have a pleasant and safe working place, everyone must do his/her part to keep the plant in order and clean. Good housekeeping will protect you and your fellow employees against slipping, tripping and other fatal accidents.

- Immediately clean up any paint, grease, oil, water, etc. that has spilled on the floor. Someone could slip causing serious injury.
- Pick up any banding, scrap metal or any other metal debris and collect them in scrap metal bins.
- Pick up any scrap lumber, saw dust etc. and put into scrap lumber bins.
- Clean up waste and organize tables and work stations that you have been using, so that the next person can start with a clean work area.
- Clean any machine and surrounding area after use.
- Return all hand tools to their proper places after use or at end of your shift.
- Keep all walkways, aisles, roadways, and areas in front of fire extinguishers, electrical panel boxes free of obstruction.
- Keep your forklift cabin area clean and do not transport or store items in cab.
- Never leave hooks or hangers on the floor always put them in their proper place.
- Always keep all brooms and shovels back to their proper areas and places after use.
- Keep the office and the surrounding area clean and clear of parts, junk, etc.
- Organize your work station as neat and efficient as possible. Avoid disorder.
- Keep storage areas neat and organized.

4.2 Handling and storing equipment

4.2.1 Handling of Equipment

Handling of the equipment are clearly elaborated under unit two (2.3)

4.2.2 Storing of Equipment

Most equipment's have environmental requirements for storage. Laboratory and tannery equipment's are cleaned and properly stored primarily so that the possibilities of reduce the error in experiments and also increase the life of equipment. In this information sheet, storing conditions of some of laboratory equipment are given as follows:

Storing of the Glassware

- Metal can scratch or stain glass and is not recommended to hold or store glass items. A thin piece of padding, such as expanded polyethylene, can prevent breakage and shocks when setting glass objects down.
- In storing, pack each piece separately in tissue and cushion each piece with a layer of air-cap or bubble-wrap or expanded polyethylene. However, because these wraps may contain unstable substances, wrap the glass in acid-free tissue first for long term storage.
- Be sure items are completely dry before packing. Label carefully.
- Avoid using valued glass items for storing liquids for any length of time. Store stoppers separately from bottles. If a stopper should become lodged, place the item in the refrigerator to contract.
- Remove the stopper. Remember to slowly bring the item back up to room temperature to avoid shattering the item.



Fig. 4: Storing of equipment's

4.3 Waste Disposal

All the liquid and solid wastes should be separately collected and kept in the provided space. For cleaning proper schedules are maintained.

Correct disposal of commercial cleaning products, the majority of which contain toxic or hazardous chemicals – is important for our health and for the overall ecological system. Most people are unaware of which products require special procedures for disposal. Many hazardous products end up in the domestic waste disposal system destined for landfill, where they can pollute the air and water systems we all rely on. When we think of hazardous wastes we tend to imagine factories poisons into the waterways. They end up in the landfill because most people don't realize the hazard, and because it is easier to just put them in the bin with other domestic waste. We need to take the time to find out how to dispose products containing hazardous waste and then follow through them properly. Most local government offices and municipal authorities are able to inform us how to dispose of these products.

Follow label directions if provided. If there are no directions, think about how you use the product.

- If it mixes with water, it's water-soluble. Most liquid, gel and powder water-soluble cleaning products can be disposed of down the drain with running water just like when you use them.

- Most solid products (soap scouring pads, sticks, etc.) can be placed in the garbage.
- For other products (such as oven cleaners, crystal drain openers and furniture polishes) call the manufacturer's toll-free number (or write to them) for disposal recommendations, or check with your local waste disposal facility.

Self-Check 4

Instructions:

Test: Short Answer Question

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. Write the general conditions for cleaning the glassware? (5 marks)
2. Write the cleaning method of pH probe for different contamination? (5 marks)
3. Write the general conditions for cleaning the conductive meter? (5 marks)
4. Write the general conditions for storing the glassware? (5 marks)

LAP Test

Name: _____ **Date:** _____

Time started: _____ **Time finished:** _____

Instructions:

1. You are provided with some used glassware. Thoroughly clean the glassware and store them appropriately in the laboratory/workplace (30 min).
2. You are provided a solution; determine its pH using the pH meter provided to you. After use, clean and store the pH meter appropriately (30 min).

Request your teacher for evaluation and feedback of your work

References

1. Leather Technicians Hand book, J.H. Sharphouse, BSc. Revised edition 1983
2. Maintenance Planning and Scheduling Handbook, Third Edition by: Richard D. Palmer
3. An Introduction to the Principle of leather manufacture, S.S Dutta, 1999
4. Leather Technologists Pocket Book, SLTC 1999
5. Chemical manufacture's Material Safety Data Sheet, Chemical manufacturer

Participants of this Module (training material) preparation

No	Name	Qualification (Level)	Field of Study	Organizatio n/ Institution	Mobile number	E-mail
1						
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