Spice and Herbs Processing Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: Cleaning and Sanitizing Equipment

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Table of Contents

Instruction sheet

L #18	LO #1- Prepare for cleaning in placed

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

- Setting the plant for the cleaning cycle
- Approving chemical compounds for cleaning and sanitizing
- Confirming cleaning agent and services
- Using tools and equipment for cleaning
- Planning equipment shutdown and taking equipment off-line and rendered safe for cleaning
- Configuring equipment and related valves and pipe work

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:

- Set the plant for the cleaning cycle
- Approve chemical compounds for cleaning and sanitizing
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- Use tools and equipment for cleaning
- Plan equipment shutdown and taking equipment off-line and rendered safe for cleaning
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1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
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Information Sheet 1 Setting the plant for the cleaning cycle

1.1. Definition

Clean out of place: Manufacturers use COP methods for pieces of equipment and utensils that cannot be cleaned where they are used and must be disassembled, and for pieces of equipment and parts that do not lend themselves to easy cleaning in place. Fittings, clamps, impellers, hoses, etc. may need to be cleaned in this manner. COP equipment that delivers consistent cleaning and sanitation ensuring food safety and quality. Because the process involves manual washing and several steps, the workflow must guard against overspray and improper stacking of cleaned parts, which can lead to recontamination. It is vital to understand, establish and follow a pre-determined COP procedure to avoid cross-contamination.

Clean-in-place is best used in conjunction with smooth-surfaced components – such as tanks, pumps, and process piping – that are too deep, long, or self-contained to reach manually. The process also presents an efficient way to clean parts that would require much time or effort to disengage from the line. These systems use chemicals, detergent and heat to clean the interior surfaces that come into contact with the product to prevent contamination and eliminate bacteria.

1.2 The cleaning operation:

1. **Prewash** - the removal of gross food particles before applying the cleaning solution.

2. **Washing** - the application of the cleaning compound. There are many methods of subjecting the surface of equipment to cleaning compounds and solutions. Effectiveness and the economy of the method generally dictate its use.

A. **Soaking** - immersion in a cleaning solution. The cleaning solution should be hot (125 degrees Fahrenheit) and the equipment permitted to soak for 15 - 30 minutes before manually or mechanically scrubbed.

B. Spray method - spraying cleaning solution on the surface. This method uses a fixed or portable spraying unit with either hot water or steam

Method of CIP cleaning

- ✓ Sanitary process lines
- ✓ Vessels
- ✓ Equipment commonly used in process plants
- ✓ without having to remove or disassemble piping or equipment to accommodate cleaning.
- ✓ CIP Systems pump cleaning, rinsing, and sanitizing solutions through the same piping path as the product to eliminate product soil from all internal surfaces.

Figure 1: CIP system

1.1. Cleaning procedures

As part of a normal production cycle, for example, between product runs, it is standard procedure to finalize the production cycle by pushing out the food product with water before the cleaning procedure starts. The procedure for cleaning a plant often follows these steps.

Step 1: Pre-rinse

The pre-rinse is a very important step in the CIP process because a well-monitored and well-executed

Step 2: Caustic Wash – (140° – 185° F) Caustic washes soften fats, making them easier to remove. Also known as caustic.

Step 3: Intermediate Rinse Fresh water flushes out residual traces of detergent remaining from the caustic

Step 4: Final Rinse

Figure 1: cleaning step

Self-check 1	Written test

Name…… ID…… Date…….

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

Part I: Short Answer (3 pts. for each)

1. Write the difference between CIP and COP?
2. Write advantages of CIP System**?**
3. Write procedures of CIP cleaning?
4. Which cleaning method is more complex and coasty?

Part 2. Choose the baste answer (1. pt.)

1. A cleaning compound that is good at mineral deposit control is

A. Surfactants B. Chelating C. Acid **D.** Basic Alkalis

2. The correct procedure in the cleaning operation is:

A. Prewash, wash, rinse, and air dry

B. Prewash, wash, sanitize, rinse, and air dry

C. Prewash, wash , rinse, sanitize, and air dry

D. Prewash, wash, and air dry

Information Sheet 2 Approving chemical compounds for cleaning and sanitizing

2.1. Cleaning

Cleaning is a process which will remove soil and prevent accumulation of food residues which may decompose or support the growth of disease causing organisms or the production of toxins.

1.2.1 Considering a good cleaner the following properties should be:

- Quick and complete solubility..
- Dissolving action of food solids.
- Good rinsing properties.
- Complete water softening power.
- Noncorrosive on metal surfaces.
- Germicidal action.
- Economical to use.

  Chemical stocks
- Detergent
- Degreaser
- Abrasive
- Acids

Self-check 2	Written test

Name…… ID…… Date…….

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

Part I: Short Answer Questions (5 pt. for each)

1. Define stock?
2. What are the factors affecting cleaning efficiency?
3. Write the Considering a good cleaner properties**?**
4. Describe the cleaning agent

Satisfactory rating >18 point unsatisfactory rating ≤15 point

Information Sheet 3. Confirming cleaning agent and services

Cleaning agent

- Sterilant
- Disinfectant
- Sanitizers
- Biocides

Table 3.1. Cleaning agents

Type of Cleaning Agent	About the agent
Detergents	• Most common type of cleaning agent • Used in homes and commercial kitchens Detergents break up dirt or soil, making it easier to wash away • Usually synthetic agents made from petroleum products • May be in the form of powder, liquid, gel, crystals
Degreasers	• Also known as 'solvent cleaners Used to remove grease from surfaces such as oven tops, counters and grill backsplashes • Methylated spirits or white spirit were commonly used as degreasers in the past • Most businesses now use non-toxic, non-fuming degreasers to prevent chemical contamination
Abrasive	• Substances or chemicals that depend on their rubbing/scrubbing action to clean dirt from hard surfaces • Usually used to clean floors, pots and pans • Use with care as abrasives may scratch items made from plastic or stainless steel
Acid	• Most powerful type of cleaning agent • Used to remove mineral deposits • Useful for descaling dishwashers or removing rust from restroom facilities • Use with care! If not diluted properly, acid cleaners can be very corrosive and poisonous

3.2. Rendering equipment to clean safe

Render

Time must allow the product to drain from tank walls and pipes. Surfaces coated with solid residues, e.g. in butter printing machines, must be scraped clean. Before cleaning starts, the remaining milk forced out of the production lines with water. Wherever possible, the milk in the piping systems is blown or flushed with water to contact tanks.

The contact of liquid during cleaning include

A. Pre-rinsing with water

Pre-rinsing should always carried out immediately after the production run. Otherwise, the milk residues will dry and stick to the surfaces, making them harder to clean. Milk fat residues are more easily flushed out if the pre-rinsing water is warm, but the temperature should not exceed 55 °C, to avoid coagulation of proteins. Pre-rinsing must continue until the water leaving the system is clear, as any loose dirt left will increase detergent consumption. If there are dried milk residues on the surfaces, it may be an advantage to soak the equipment. Soaking softens the dirt and makes cleaning more efficient.

The mixture of water and milk from the initial pre-rinsing can be collected in a tank for special processing.

B. Cleaning with detergent

The dirt on heated surfaces is normally washed off with alkaline and acid detergents, in that order or the reverse order, with intermediate water flushing, whereas cold surfaces are normally cleaned with alkalis and only occasionally with an acid solution. To obtain good contact between the alkaline detergent solution – typically *caustic soda (NaOH)* – and the film of dirt, it may be necessary to add a wetting agent (surfactant), which lowers the surface tension of the liquid.

The detergent must also be capable of *dispersing* dirt and *encapsulating* the suspended particles to prevent flocculation. Polyphosphates are effective emulsifying and dispersing agents that also soften water. The most commonly used are sodium triphosphate and complex phosphate compounds.

A number of variables must be carefully controlled to ensure satisfactory results with a given detergent solution.

These are:

- Concentration of the detergent solution

- Temperature of the detergent solution
- Mechanical effect on the cleaned surfaces (velocity)
- Duration of cleaning (time)

C. Detergent concentration

- The amount of detergent in the solution must be adjusted to the correct concentration before cleaning starts.
- During cleaning, the solution is diluted with rinsing water and milk residues. Some neutralization also takes place
- . It is therefore necessary to check the concentration during cleaning. Failure to do this can seriously affect the result
- . Checking can be done either manually or automatically.
- The dosage must always be according to the detergent supplier's instructions, as increasing the concentration does not necessarily improve the cleaning effect
- – it may indeed have the reverse effect due to foaming, etc.
- Using too much detergent simply makes cleaning needlessly expensive.
- As a rule of thumb, cleaning with alkaline detergent should be done at the same temperature as the product has been exposed to, but at least 70 °C

D. Detergent temperature

The effectiveness of a detergent solution increases with increasing temperature by

- A blended detergent always has an optimum temperature that should be used
- As a rule of thumb, cleaning with alkaline detergent should done at the same temperature as the product has exposed to, but at least 70 °C.
- Temperatures of 68 – 70 °C recommended for cleaning with acid detergents.

Mechanical cleaning effect

In manual cleaning, scrubbing brushes are used to produce the required mechanical scouring effect,

In mechanized cleaning of pipe systems, tanks and other process equipment, the mechanical effect supplied by the flow velocity.

The detergent feed pumps dimensioned for higher capacities than the product pumps, with flow velocities of 1.5 – 3.0 m/s in the pipes. At these velocities, the liquid flow is very turbulent. This results in a very good scouring effect on the surfaces of the equipment.

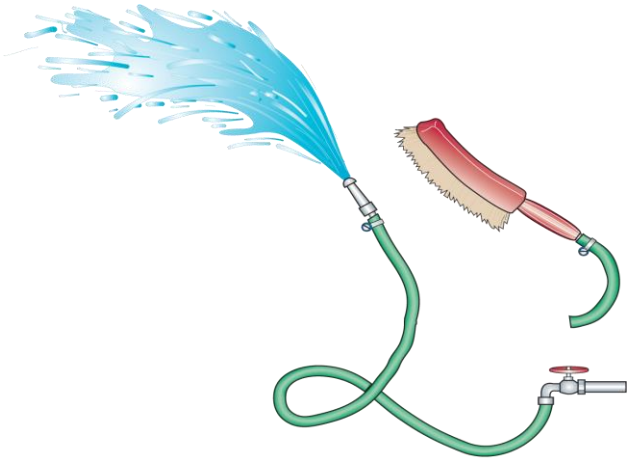

Figure 1. Examples of mechanical cleaning effects.

The mechanical effect can be provided either by scrubbing brushes in a manual cleaning system, or by the flow velocity in a mechanized system.

Duration of cleaning

The duration of the detergent cleaning phase must be carefully calculated to obtain the optimum cleaning effect. At the same time, the costs of electricity, heating, water and labour must be taken into consideration. It is not sufficient to flush a pipe system with a detergent solution. The detergent must circulate long enough to dissolve the dirt. The time this takes depends on the thickness of the deposits (and the temperature of the detergent solution). Heat exchangers encrusted with coagulated protein must be exposed to circulating an alkaline detergent followed by an acid solution for in total 20-60 minutes, whereas 10 minutes' treatment with alkaline solution is enough to dissolve the film on the walls of a milk tank.

Rinsing with clean water

After cleaning with detergent, the surfaces must be flushed with water long enough to remove all traces of the detergent. Any detergent left in the system after cleaning can contaminate the milk. All parts of the system must be thoroughly drained after rinsing. Softened water is preferred for rinsing. This prevents deposition of lime scale on the cleaned surfaces. Hard water with a high content of calcium salts must therefore be softened in ion exchange filters to 2 – 4 °dH (German degrees of hardness). The equipment and pipe systems are practically sterile after the treatment with strong alkaline and acid solutions at a high temperature. It is then necessary to prevent overnight growth of bacteria in the residual rinsing water in the system. This can be

done by acidifying the final rinse water to a pH of less than 5 by adding phosphoric or citric acid. This acid environment prevents the growth of most bacteria.

Disinfection

Properly carried out cleaning with acid and alkaline detergents renders the equipment not only physically and chemically but also, to a large extent, bacteriologically clean. The bacteriological cleaning effect can be further improved by disinfection. This leaves the equipment virtually free from bacteria. For certain products (UHT milk, sterile milk), it is necessary to sterilize the equipment to render the surfaces completely free from bacteria.

Dairy equipment can be disinfected in the following ways:

- Thermal disinfection (boiling water, hot water, steam)
- Chemical disinfection (chlorine, acids, iodophors, hydrogen peroxide, etc.)

Disinfection can be done in the morning, immediately before milk processing begins. The milk can be admitted as soon as all the disinfectant has been drained from the system.

If disinfection takes place at the end of the day, the disinfectant solution should be flushed out with water to avoid leaving any residues that may attack the metal surfaces.

Cleaning-in-place systems

Cleaning-in-place means that rinsing water and detergent solutions are circulated through tanks, pipes and process lines without the equipment having to be dismantled. CIP can be defined as circulation of cleaning liquids through machines and other equipment in a cleaning circuit. The passage of the high-velocity flow of liquids over the equipment surfaces generates a mechanical scouring effect that dislodges dirt deposits. This only applies to the flow in pipes, heat exchangers, pumps, valves, separators, etc. The normal technique for cleaning large tanks is to spray the detergent on the upper surfaces and then allow it to run down the walls. The mechanical scouring effect is then often insufficient, but the effect can to some extent be improved by the use of specially designed cleaning devices, one of which is shown in Figure 21.3. Tank cleaning requires large volumes of detergent, which must be circulated rapidly

Figure 1: cleaning step

Rotary jet head for tank cleaning. The rotary jet head have four nozzles rotating in the vertical plane and the head itself rotate in the horizontal plane. Rotation is created with an internal gearbox.

Self-check 3	**Written test**

Name…… ID…… Date…….

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

Short Answer

1. List cleaning detergents?(2pts)

Information sheet 4 Using tools and equipment for cleaning

Cleaning Equipment

- The development of automatic (CIP) milking and bulk tank systems have been great time-savers for dairy farmers.
- The systems must properly maintained. Many problems will occur if these systems not checked regularly, at least twice a year.

Improper or careless cleaning and sanitizing of equipment and tanks is a major cause of inferior milk quality. It need not be if cleaning water and cleaning compounds are compatible and a precise procedure formulated and followed.

General cleaning and sanitizing procedure of dairy product processing equipment

Step 1. Remove all exposed products

Step 2. Dry clean/ sweep area

Step 3. Wet area to clean

Step.4. clean and scrub area

Step 5. Rinse

Step 6. Sanitize

Step 7. Air dry/store properly

Self-Check 4	**Written Test**

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

I. Choose the best answer (each 2 point)

1._____ reduces bacterial numbers on surfaces but does not eliminate all types of bacteria

A. Sanitizing B. Cleaning C. Equipment D. All

2. _____ Flush pipeline and bulk tank with sanitizer immediately before milking

A. Cleaning B. Sanitizing C. Washing D. All E. None

3. Among objective of cleaning which one is/ are destruction of all microorganisms cleaning producers?

A. destruction of all microorganisms' C. Bacteriological cleanliness E. All

B. Chemical cleanliness D. Sterile cleanliness

Part II fill the blank space

1. List down the factor affect sanitizing of surfaces within 30 minutes destroys nearly all lingering organisms for the next milking (5%)

_____

_____

_____

_____

Information sheet 5 Planning equipment shutdown

5. Shutdown Planning

The Planning phase is all about identifying the shutdown work scope, then identifying parts, labor, equipment and other resources required to carry out the shutdown. The output of the planning phase is a set of comprehensive shutdown work packs, assurance that everything is available to carry out the work. It is imperative that a specialist planning team is assigned to this phase. That is to say, do not try to use the routine planners to carry out the shutdown planning 'in their spare time'. The nature of shutdown planning requires laser focus, and the planners must not be distracted by other routine activities.

5.1. Equipment

Packaging .Cleaning equipment, heavy lifting equipment, hand tools, specialist tooling. The list goes on when it comes to equipment requirements. It is important that all equipment requirements are identified for all shutdown jobs as early as possible, as some of these may require a lengthy process to properly organize.

5.2Shutdown Scheduling

it is important that a dedicated shutdown scheduling is appointed. The required skill set for a shutdown scheduler is different than for a shutdown planner, thus it is better to have separate planners and schedulers. The core task of the Shutdown Scheduler is to activities. Other core activities during the scheduling phase are:

- Ensure the full scope of work can be carried out within the allocated time.
- Define the timing requirements for all parts, labor, equipment, and other resources for execution of shutdown maintenance activities.
- Define the critical path activities for the shutdown.
- Sequence the work to optimize the use of all shutdown resources, often referred to as resource leveling.
- Identify shutdown job priorities, and utilize float to schedule shutdown work in accordance with priorities.

Self-check 5	Written test

Name…… ID…… Date…….

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

Short Answer Questions

1. Describe Shutdown planning?(5)

Information sheet 6 Configuring equipment and related valves and pipe work

6.1 Prepare equipment for cleaning

In carrying out the fluid power assembly operations, required to follow specific assembly techniques in order to assemble the various components, which will include rigid and flexible pipework, hoses, valves, actuators and cylinders, regulators, switches and sensors. The assembly activities will also include making all necessary checks and adjustments to ensure that fluid power components are correctly positioned and aligned are dimensionally accurate and secure; pipework is dimensionally accurate and free from ripples, creases and damage; and joints are checked for security, with threaded devices tightened correctly. You will also be expected to carry out appropriate test procedures (such as leak or pressure) to confirm that the fluid power assembly meets the operational performance required.

Self-check 6	Written test

Name…… ID…… Date…….

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

Short Answer Questions (5 pts)

1. Why assembly activities checks and adjust for cleaning operation?

2. Fluid power assembled what is the reason behind?

LG #19	LO #2. Operate and monitor clean and sanitize equipment to meet workplace requirements

Instruction sheet

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

- Monitoring and verifying of daily housekeeping program.
- Monitoring and verifying of cleaning program.
- Designing location and facility for cleaning of cleaning tools and equipment.
- Undertaking cleaning and sanitizing equipment cycle
- Monitoring and recording cleaning and sanitizing process
- Inspecting equipment to confirm operating condition and cleanliness
- Storing, cleaning equipment and chemicals
- Disposing of waste from cleaning process
- Restoring equipment
- Identifying, rectifying and/or reporting out-of-specification process and equipment performance

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Information Sheet 1 Monitoring and verifying of daily housekeeping program.

1.1. Monitoring and verifying of daily housekeeping program

A housekeeping standard is a documented, step-by-step process on how to effectively perform housekeeping procedures, such as daily cleaning and maintenance tasks.

Every coffee processing professional understands that clean facilities are critical to product safety. They're also critical to the safety, health, and morale of everyone who works in your plant. The Occupational Safety and Health Administration (OSHA) issues general "housekeeping" guidelines for every workplace

Clean and dry floors: are a priority in every workspace. A new facility makes sure your floor is made of material appropriate to your plant's needs. Install proper drainage, and provide platforms for safe standing.

Effective sanitation: coffee processing facilities have to be careful about defects both for workers and plants. Remove faults tools and keep them. During sanitize coffee and tea machine care must be given.

Safe storage: Ensure your routes and workspaces stay clear by providing proper storage and workshop. If that storage is overhead, make sure there's no risk of falling.

Fire awareness: fire hazards in coffee processing arise primarily from dust accumulation.

A culture of clean: best housekeeping success depends on employees' efforts and requires a culture cleaning. Housekeeping can't be a one-time thing, so that encourage by providing training and proper tools.

Ultimately, your attention to housekeeping sends a message to employees that you care about their safety and well-being in the workplace.

Self-check 1	Written test

Name…… ID…… Date…….

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

Short Answer Questions (15%)

1) What is housekeeping SOP (5 point)
2) What does mean (OSHA)? (5 point)
3) Write down general “housekeeping” guidelines for every workplace? (5 points)

Information Sheet 2 Monitoring and verifying of cleaning program.

The survey should include the operating schedule of the spice and herbs processing plant

- the number of shifts and volume of products produced in
  - ✓ Day
  - ✓ Week
  - ✓ Month
  - ✓ Season
  - ✓ The entire year.

Cleaning and sanitizing agents required for cleaning the production areas floor			
Product Name	Purpose	Methods of application	Concentration/formulation
Potable water	Rinsing	High pressure on non-product area	
Sanitizer/chlorine	Disinfectant	Chelating agent	as per label instruction
Detergent (caustic soda, caustic potash, coronate, silicate, phosphate)	Sequestering agent		

Information Sheet 3 Designing location and facility for cleaning of cleaning tools and equipment.

3.1. Equipment design

Processing, packaging, and storage equipment should be designed, installed and maintained in such a manner as to produce a quality product without introducing foreign objects or pathogens into to the product. ASTA recommends that all of its members, their suppliers, and employees adhere to the equipment guidance below.

- Equipment design and construction should allow for proper cleaning, sanitization, and inspection.
- Equipment should be free of flaking paint, rust, or other contaminants that could become detached; stainless steel is preferred.
- Tanks or other vessels containing food products must be covered where the potential exists for contamination.
- Thermometers, recording charts, and pressure gauges must be accessible and convenient to read
- Utensils, tools, and equipment should have designated and sanitary storage areas, where food-contact surfaces should be protected from contamination.
- Equipment should be designed or located to preclude condensate or to divert condensate away from product and product contact surfaces. g) Wherever possible, equipment should be manufactured with continuous welds to facilitate easy cleaning and prevent microbial risk.

Self-check 3	Written test

Name…… ID…… Date…….

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

Short Answer Questions

1. What is Equipment design?(5)

Information Sheet 4 Undertaking cleaning and sanitizing equipment cycle

The cleaning operation:

1. **Prewash** - the removal of gross food particles before applying the cleaning solution.

2. **Washing** - the application of the cleaning compound. There are many methods of subjecting the surface of equipment to cleaning compounds and solutions. Effectiveness and the economy of the method generally dictate its use.

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B. Spray method - spraying cleaning solution on the surface. This method uses a fixed or portable spraying unit with either hot water or steam

Method of CIP cleaning

- ✓ Sanitary process lines
- ✓ Vessels
- ✓ Equipment commonly used in process plants
- ✓ without having to remove or disassemble piping or equipment to accommodate cleaning.

CIP Systems pump cleaning, rinsing, and sanitizing solutions through the same piping path as the product

Self-check 4	Written test

Name…… ID…… Date…….

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

Short Answer Questions

1. List the method of CIP cleaning?(5)

Information Sheet 5 Monitoring and recording cleaning and sanitizing process

5.1 Monitoring cleaning process

Monitoring the cleaning processes ensures the process is performed correctly and also provides an early warning if it is not performing as validated.

Importance Monitor the Cleaning Process

- Control over a cleaning process can be demonstrated by a review of all relevant data at specified time increments. Relevant data includes sample results and trending of those results.
- Provides additional reassurance to the visual assessment and conductivity verification that is performed with each cleaning.
- Consistent with the lifecycle approach to validation (Design, Formal Validation Studies, and Ongoing Controls) as well as continuous improvement for manufacturing quality and efficiency

Monitoring the process

- chemical strength
- cycle time
- temperatures
- time
- storage tank levels
- control panels and systems

Chemical strength

The type of chemical being applied will affect how the soil is removed from the surface. Understanding how to utilize the right chemical is critical in achieving the desired level of clean. Titration kits help with the initial understanding of how to obtain the best results and how they can be achieved. This will allow you to check for alkalinity, water hardness, pH levels, iron content, chlorine presence and sour levels.

Self-check 5	Written test

Name…… ID…… Date…….

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

Short Answer Questions (5 pts for each)

1 Define monitoring cleaning process?

2. Explain briefly factors affecting cleaning process?
3. Write the cleaning agent?
4. What is the Importance of Monitor the Cleaning Process?

Information Sheet 6 Inspecting equipment to confirm operating condition and Cleanliness

6.1. Inspecting equipment to confirm operating condition and cleanliness

Spice and herbs processing manufacture requires machines and installations by the use of which the raw material transformed into a product. Each piece of equipment, which the plant assembled, must perform its duty. Achieving the exact performance objectives of the plant as a whole requires maximizing the efficiency of all equipment that confirmed by inspecting equipment operation condition and cleanliness.

The term “efficiency used in this context as a comparison between the designed and the actual performance. Should, for instance, the set holding temperature in a pasteurization plant be 72°C (±1°C), the efficiency of the process is determined by

- Checking whether, in the course of pasteurization of the product
- Any deviation from the wanted temperature levels occurs.
- In other words determining the efficiency requires
  - ✓ Collecting data concerning the actual performances
  - ✓ Comparing them with those expected.

Any equipment subjected to wear and tear

- Its efficiency and performance decrease with time.
- Keeping the plant performance at the required level the responsibility of the dairy engineer and his staff.
- To fulfil this responsibility he needs to know what the actual performance is.
  - ✓ By detecting a drop in performance, he can take corrective action.
  - ✓ But his first duty is to prevent any drop in efficiency by taking care of the equipment in a rational way
  - ✓ servicing the machine
- This servicing procedure will be structured according to the needs of the plant but it will always be based on:
  - ✓ Inspection of performance based on log book entries
  - ✓ Scheduled inspection combined with scheduled servicing at selected points considered crucial for plant efficiency

- ✓ Scheduled inspection of all other sections of the plant aiming at detection of faults not detectable by other routine procedures.

The practice of plant performance inspection and servicing of machines should carried out with sufficient simplicity and thoroughness to yield the best results.

The creation of a routine system in this respect is the first step in establishing good habits of proper care of all items of equipment. It is essential to determine

- what should be inspected
- how often and how to leave out of the procedure
- Any collection of information, which does not serve the main purpose.
- On the other hand, the system must beard toward prompt discovery of each and every deviation from normal in the plant or in the machine operation
- Toward immediate action aiming at corrections at the detected sources of the deviation.

A. Inspection based on logbook entries

Logbooks contain the record of the equipment performance and usually instructions to and from the operator.

They designed to keep records of the daily processing runs and their recording elements often replaced at least partly by automatic recording charts.

B. Scheduled inspection combined with scheduled servicing

Inspection cum servicing schedules are the most crucial task for the engineering team responsible for preventive maintenance. There are three sources of knowledge on which, these schedules based and listed as follows:

- Manufacturers' manuals
- Equipment records
- Plant experience.

C. Scheduled inspection of non-standard items

The third group of inspection schedules concerns parts of the plant assets, which not covered by the foregoing two groups and based mainly on **experience.**

These schedules cover inspection **of**

- **civil structures**
- **ducts and pipelines** between distant section or buildings
- underground structures and mains
  - ✓ water storage tanks, wells,

- ✓ Many other parts of the plant not described in manufacturers' manuals.
- ✓ In this group, the inspection of the sanitation of the whole plant is also included, which contains anything from **painting to insect** and **rodent** control.
- ✓ Neatness and orderliness are important, both inside and outside the plant

D. Inspection schedules recording

All inspection schedules must contain information concerning

- what to inspect
- when
- how often

This information needs to record either on overall charts on which equipment listed in a selected order and the necessary functions of the inspections and servicing, including servicing instructions, are specified, or on individual cards for each section of a machine.

An inspection schedules card file is widely considered as advantageous, particularly in larger scale plants. An example of an individual inspection schedule card

E. Lubrication schedules

These are an integral part of preventive maintenance schedules. Most machines have some elements requiring lubrication, such as gears, bearings, cylinders, chains, etc. Lubrication reduces wear in the lubricated elements. Correct lubrication practices can reduce the overall machine maintenance costs by as much as 20 percent although the costs of lubricants may represent as much as 10 percent of the maintenance costs of a plant. The term lubrication includes lubrication oiling and greasing and the indication on costs svings given above covers all three. Lubrication is such an essential part of the dairy engineer's activities that in larger scale plants one staff member employed only to take care of this activity, selecting lubricants, teaching mechanics and operators and supervising their work in this respect.

In plants where a lubricator is employed and lubrication schedule cards are used, the routine steps of the lubricator as as follows:

1. Collecting the schedule cards for the day
2. Examining the lubrication programme for the day
3. Collecting necessary lubrication tools and lubricants
4. Lubricating and tagging the machines after completing the job

5. Recording the job on card - adding notes on essential observations
6. Returning the cards to the engineer in charge or to the clerk

4. Spare parts programmed

The spare parts programmed particularly intricate task for a dairy engineer in a plant in a developing country. In most cases, the plants designed abroad and almost all equipment importedThe engineering stores should contain consumable items such as gaskets, standard lubricants and paints

Three basic groups of engineering accessories:

- Equipment spare parts
- Components
- Pipes and fittings, bolts, nuts and washers, bars and plates of different metals, electric components and other general types of engineering accessories.

5. Maintenance action

The preparatory part of the PMP as well as the plan of action presented in the foregoing leads to the correct performance of the physical maintenance of the whole plant and each of its components

In the majority of instances, the decision-making engineer must consider whether:

- The work can be done during the operation of the machine
- The work can be done after normal operation hours without disrupting the normal processing schedules
- The work requires time, skills and resources available in the plant or it is necessary to call in other specialized companies or people.

Self-Check 6	Written Test

Name…… ID…… Date…….

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

Part I Choose the best answer (each 2 point)

1._____ the record of the equipment performance and usually instructions to and from the operator

A. Inspection based on logbook entries items

B. Scheduled inspection combined with scheduled servicing

C. Scheduled inspection of non-standard

D. All

2. All inspection schedules must contain concerning information except!

A. what to inspect B. when C. how often D. None

Part II Fill the blank space

1. List down the servicing procedure structured of machine based on the needs machine plans! (3%)

_____

_____

_____

2. Write the three sources of knowledge Scheduled inspection combined with scheduled servicing based for preventive maintenance!(3%)

_____,_____,_____

3. Write the three basic groups of engineering accessories Spare parts programmed in dairy machine inspection and maintenance! (3%)

_____,_____

_____,_____

Information Sheet 7 Storing Cleaning equipment and chemicals in workplace

7.1. Storing Cleaning equipment and chemicals in workplace

7.1.1. Storage of equipment's

- After cleaning , all multi use milk containers , utensils, and equipment shall be stored to assure complete drainage
- Prevent contamination prior to the net use.
- Must be stored to be protected from splash , dust, insects, overhead dropping , unnecessary handling, or any other possible of contamination
- Must be stored above the floor on clean racks or other storage devices

7.1.2 Safety Precautions

A. Cleaning and sanitizing chemicals should be stored in

- locked room inaccessible to children
- Unauthorized personnel.
- The storage room should be on cooler side
- Should lighted so labels can read.
- Storage drum openings should kept tight to prevent dissipation of ingredients into the air, including teat dips and sprays.
- Chemicals should have spill containment.
- Material safety data sheets should be kept on file
- Detergent-acid resistant gloves, proper safety eye protection or a face shield when mixing chemicals and protective footwear to prevent slips should always
- worn.

B. All cleaning and sanitizing chemicals must labeled properly such as

- The label and other manufacturer's directions should read
- Chemicals should be mixed in an open, ventilated area.
- Use extreme caution when mixing or handling caustics or acids
- **" Slowly add chemicals to water"**
- Especially **caustics** never add water to chemicals and never add to hot water.
- Never mix chlorine compounds with other detergents or acids as it may produce deadly chlorine gas.

C. cleaning program or directions should posted for

- Each piece of milk handling equipment.

- Pipelines
- bulk tanks
- Equipment that cleaned manually should have directions posted which cover
  - ✓ Rinsing
  - ✓ Washing
  - ✓ Sanitizing.

D. Directions in each cleaning program must be specific as

- ✓ Temperature
- ✓ Gallons of water used in each cycle
- ✓ Amounts in ounces of each chemical.

- Never climb into a closed container such as bulk tank (single manhole tanks in particular) because of lack of oxygen.
- Chemical vapors inhaled can burn sensitive tissues in your
  - ✓ Eyes
  - ✓ mucous membranes in your nose
  - ✓ Sinus cavities and lungs.
- Have phone number of area poison, control center and local hospitals near telephones.
- Have an eyewash station located near mixing areas.
- Any chemical in the eyes should be flushed with water immediately for 15 minutes, followed by a doctor's examination.
- Any chemical detergent contacting the skin should flushed immediately with water for 15 minutes.
- Remove any clothing that has contaminated by chemical detergent and flush affected area. Obtain medical assistance at once.
- Empty containers must thoroughly, rinsed and disposed of according to local environmental regulations.

Self-Check 7	Written Test

Name…… ID…… Date…….

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

Part I fill the blank space

1. List down the procures of store dairy equipment's (4%)

_____

_____

_____

_____.

2. Specific the directions in each chemical cleaning program must performed! (3%)

_____,_____

_____,_____

3. Mention the information must all cleaning and sanitizing chemical labeled before storage and clean equipment (5%)

_____

_____

_____

_____

_____

Information Sheet 8 Disposing Waste from cleaning process

8.1. Disposing Waste from cleaning process

It is defined as handling of all wastes in the plant including food wastes, scratch paper, and fallen dry leaves on the ground, trim wedges and many others into useful products. It is the utilization of wastes by recycling and reusing these wastes into other valuable products good for the health of the people to arrive at zero waste.

Legal Basis of Waste Management

Republic Act no. 9003 known as the National Solid Waste Management Act issued as part of War on Waste (WOW). To fight against waste provides that all wastes matter will be recycled and reused into useful items.

Different Ways of Waste Disposal

A. For Liquid Wastes Control

1. Screening. It is employed as a preliminary treatment for removal of large particle of solid prior to final treatment to be discharged into a municipal sewage system.

2. Lagos oning – Biological Disposal. It consist of holding the wastes effluent in open earthen pits which accomplish treatment under five principles namely:

- Biological Action (aerobic and anaerobic)
- Sedimentation
- Soil absorption
- Evaporation
- Dilution

Two basic types of Lagoons used in disposing industrial wastes:

1. Impounding Lagoon. This meets the requirements of industries discharging small daily volumes of wastes or a seasonal operation, i.e., the canning industry. In this system, the volumetric capacity is equal to the total waste flow, less loss due to evaporation and percolation.

2. Flow-through Lagoon. It requires less land and relies on biological action.

Spray irrigation – land disposal. This serves as an economic and unobjectionable waste disposal method when land is available. It is limited only by the capacity of

spray field to absorb the wastewater. The factors required to set up a spray irrigation are as follows:

- Quantity of effluent for disposal (per hour, per day, per week, per season)
- Land available for disposal area such as the texture of soil profile, area and dimensions, topography, depth of ground water, location with respect to plant, and infiltration capacity
- Character effluent
- Climate during operational season.

Chemical Treatment. Chemical precipitation is a form of partial treatment with the use of chemical coagulants of lime followed by ferrous sulphate or alum. It removes 25% to 50% of the biochemical oxygen demand. Analytical measurements such as biochemical oxygen demand (BOD), chemical Oxygen demand (COD) and solid determination are valuable as control measurements.

Waste materials from food-processing and foodservice facilities can be hard to treat because they contain large amounts of

- Carbohydrates
- Proteins
- Fats
- Minerals.

Untreated wastes from food processing

- Dairy plants
- Food-freezing and dehydration plants
- Processing plants for red meats
- Poultry
- Seafood can smell unpleasant and pollute water.

Processors need to treat and biologically stabilize the organic matter in these wastes before they discharge it into

- Rivers
- Lakes
- Oceans.

Improper waste disposal is hazardous to **humans** and **aquatic life**. Federal, state, and local regulatory agencies and the public are demanding better treatment of industrial waste.

Processors and regulatory agencies are responsible for prompt and complete disposal of waste materials

When waste accumulates, even for short periods

- It attracts insects and rodents
- Smells unpleasant
- Becomes a public nuisance
- Looks unattractive.

Self-Check 8	Written Test

Name…… ID…… Date…….

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

Part I. Choose the best answer (each 2 point)

1. Which of the following water body is/ are pprocessors discharge treat and biologically stabilize organic matter:

A. Rivers B Lakes C. Oceans. D. All

Part II Fill the blank space

1. List down the Waste materials from food-processing and foodservice facilities that produced in large amounts (4%)

_____,_____

_____,_____

2. List down untreated wastes produced from food processing! (5%)

_____,_____

_____,_____

3. What are the first step in dairy product processing waste disposal serving? (4)

_____,_____

_____,_____

Information Sheet 9 Restoring equipment in operating order

9.1. Restoring equipment in operating order

All spice and herbs product processing equipment and utensils should be

- Stored in a manner that permits water to drain and equipment to air dry.
- In CIP systems, a drain should be located at the lowest point in the system.
- Teat cup liners and other rubber parts that contact with milk must cleaned after each milking and sanitized before the next milking.

Liners and other rubber parts should replace

- when they have used for the recommended number of milking (e.g. 1200)
- When they become: soft, cracked or rough and Have holes.
    - ✓ Pores and cracks in rubber parts protect soil and microorganisms from effects of cleaning and sanitizing.

Self-Check 9	**Written Test**

Name…… ID…… Date…….

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

Short answer

1. List the importance of restoring equipment?(2)

Information sheet 10	Identifying, rectifying and reporting out-of-specification process and equipment performance

10.1. Introduction

The term out of specifications, are defined as those results of in cleaning process or finished product testing, which falling out of specified limits. The out of specifications (OOS), arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an out of specifications (OOS) has arrived, a root cause analysis has to be performed to investigate the cause for OOS for cleaning process and equipment performance. The build-up of coffee oils over time can mean the grinder giving a poor performance .

Specifications

- Up-to-date specifications shall exist for all:
- Raw materials including packaging materials;
- Finished products; and
- Intermediate products when appropriate.
- All specifications shall be pertinent and thoroughly defined, and shall ensure compliance with the QMS and food safety
- guidelines of the organization as well as other regulatory requirements
- All specifications shall, when appropriate, be formally agreed to with customers or any other required person, company or organization.
- The operator shall operate a specification review procedure for its customers and shall have all appropriate documentation relating to product quality and safety.

10.2 Rectifying out-of-specification cleaning process outcomes

At its core, problem solving is a methodical four-step process. You may even recall these steps from when you were first introduced to the Scientific Method.

- First, you must **define** out-of-specification process outcomes. What is its cause? What are the signs there's a problem at all?
- Next, you **identify various options** for solutions. What are some good ideas to solve this?

- Then, **evaluate your options** and choose from among them. What is the best option to solve the problem? What's the easiest option? How should you prioritize?
- Finally, **implement the chosen solution**. Does it solve out-of-specification process outcomes? Is there another option you need to try?**.**

Self-Check 10	**Written Test**

Name…… ID…… Date…….

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

Short answer

1. Define the term out of specifications?(2)

LG #20	LO3: Dispose of waste and return plant to operating condition

Instruction sheet

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

- Flushing and disposing cleaning chemicals from plant
- Setting up plant according to company policies and procedures

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:

- Flush and dispose cleaning chemicals from plant
- Set up plant according to company policies and procedures

Learning instruction

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks
- Perform Operation Sheets
- Do the “LAP” TEST

Information sheet 1	Flushing and disposing cleaning chemicals from plant

1.1 Cleaning chemicals

Industry applications although a range of chemicals are effective against the most common foodborne pathogens, there are a few that are most frequently used chemicals Sodium Hypochlorite, Ammonium Hydroxide (Ammonia), Propellant Gas, Phosphates

1.2. Cleaning methods

1.2.1 Wet/ Hydraulic Cleaning Methods

- Flushing is the oldest and effective pipe cleaning technique, cleaning an existing pipe inexpensively.
- It helps to remove disinfectant residual , expel harmful bacteria, remove suspended sediment, and clear up other problems of water discoloration or objectionable taste and odor.
- It can also help to clean the pipes by lifting loose sediments, reduce chlorine demand, and mitigate water quality risks. This technique cannot clean away tuberculation and other hard scales.
- It is not effective in cleaning sediments and bio films from large pipes. Moreover, it cannot solve stem from source water problems, treatment deficiencies, cross connections, and unlined cast iron pipe

1.2.2 Techniques of Flushing on coffee processing industry

There are two techniques available in flushing which are

- **Conventional flushing** is nothing but opening up one or more fire hydrants and allowing the water to run in to the sewers until the sediments, bio films and poor quality water are removed.
- **Unidirectional flushing** is a technique in which valves are closed and fire hydrants are opened in a systematic way. Initially, the water travels towards hydrant in a single direction. Water in single direction produces high velocities in the main, which makes the cleaning more effective. Secondly, the water is flushed in a sequence such that the water is being flushed comes from pipes that have been previously cleaned. Unidirectional uses less water compared to conventional flushing and can be used to locate hydrants in need of repair. Used Different combinations of detergents and sterilants at different temperatures allow

flexibility in operation Figure 1 presents the flushing operation and different nozzles for flushing

Figure 1: Flushing Operation and Different Nozzles

1.2.3 Coffee Grinding cleaning steps : grinder cleaning schedule to keep them in prime condition:

Daily/after each use:

1. The coffee chute is sealed off and excess coffee is ground. – Make sure you grind off as much as possible during this step, to avoid excess coffee being inside the grinder or coffee beans sitting on top of the burrs for the next step.
2. Turn off the power.
3. Remove hopper.
4. Coffee is removed and sealed in a bag. Remember to keep your unground coffee sealed off and in a cool, dark place to keep it fresh. Avoid your refrigerator though.
5. If it's a manual dosing grinder, the blades are plunged. This is the step that cleans inside the grinder When plunging, removing a small portion of the grinds within the grinder. Need to put the hopper back on and activate the grinder for a few seconds. Then repeat the above step a few times to get it really clean.
6. If it's an auto dosing grinder, grab a vacuum:
   - Use a nozzle attachment for your vacuum. Put the hopper back on, expose the grill where the coffee drops out and hold the vacuum to it. Activate the grinder to thoroughly remove all the coffee, and persist until you can only see metal around the grill. Be aware, some vacuums won't handle this well and using a commercial vacuum is recommended.

7. Wash your hopper to remove all the chaff. Make sure you thoroughly dry the hopper before putting it back on the grinder.
8. Reassemble the grinder.
9. Wipe out the dosing chamber with a damp cloth. This is enough cleaning to see a measureable result in quality. need to disassemble the unit. For the brave and/or knowledgeable, disassembling the grinder is recommended at regular intervals (weekly to monthly) reassembly.

1.2 Dry cleaning

- Dry cleaning procedures are used for products that are smaller, have greater mechanical strength and possess lower moisture content (for example coffee and tea powders).
- After cleaning, the surfaces are dry, to aid preservation or further drying.
- The main groups of equipment used for dry cleaning are:
- air classifiers
- magnetic separators
- separators based on screening of foods

1.3 Importance of disposal cleaning chemicals

The correct disposal of chemical cleaning products can help to prevent damage to the environment caused by chemicals entering water supplies or food chains, which could either eventually or immediately cause damage to wildlife or humans.

1.4 Disposal of industry chemical

1. Identifying the Proper Waste Disposal Method

- **Read the product label.** Some chemical products come with disposal instructions right on the label. Even for products without disposal instructions can be aware of the warnings and cautions concerning said products.

Figure 2: read the product label disposal instructions

- **Read the material safety data sheet.** In addition to the product label, you want to read the MSDS for industrial chemicals. The MSDS gives you important information about the chemical: its toxicity, reactivity, and disposal considerations.
- **Search the list of hazardous wastes.** The Environmental Protection Agency (EPA) has many resources on determining the waste is considered hazardous and what kind of special disposal is necessary. The EPA regulates hazardous waste using the Resource Conservation and Recovery

2. **Disposing of Common Chemicals**

- **Use proper safety precautions.** When dealing with any chemicals, you should always wear gloves, long-sleeved shirts, pants, goggles, and closed-toe shoes. You want to minimize skin exposure as much as possible. Chemicals often emit noxious fumes, so you want to work in a well-ventilated area.
- **Dilute bleach and hydrogen peroxide to pour down the drain.** Make a very dilute solution of bleach or hydrogen peroxide by adding at least 10 times the amount of water. Let the dilute solution sit for at least an hour before disposal
- **Store solvents for special collection.** Solvents such as paint and varnish must be disposed of at a special recycling center or collected by a hazardous waste company. Many home improvement stores have paint recycling centers as well**.**
- **Recycle automotive fluids.** Car-related fluids such as antifreeze, motor oil, and transmission fluid can be collected and recycled. None of these items can be thrown away or disposed of down the drain. Collect the fluid and bring it to a nearby recycling center.
- **Drain all aerosol canisters.** Do this by turning them upside down and spraying them into an absorbent material, like paper towels, rags, or a sponge. Once the can has lost all of its pressure, wrap it in several layers of newspaper and throw it out with regular household trash.
- **Return pool chemicals back to your local pool store.** Most pool stores will take pool chemicals and dispose of them properly. Alternatively, you can check with the community pool and see if they have any need of your unused chemicals **.**
- **Submit industrial chemicals to a hazardous material collection system.** If you are unsure of the proper method of disposal for a potentially dangerous

product, like a car battery, seek out a hazardous material collection service nearby and see if they will take your waste. Most communities should have such a service.

3. Neutralizing Strong Acids or Bases for Disposal

- **Know the acids and bases that cannot be neutralized.** There are some acids and bases that cannot be neutralized and disposed of down the sewer drain. Disposal of the following should be done through the proper hazardous waste collection channels:
  - Perchloric acid
  - Concentrated nitric acid
  - Fuming (concentrated), sulfuric acid
  - Hydrofluoric acid
  - Acids or bases with dyes or surfactants
  - Acids of bases with heavy metals
  - Organic acids and bases that remain toxic after neutralization

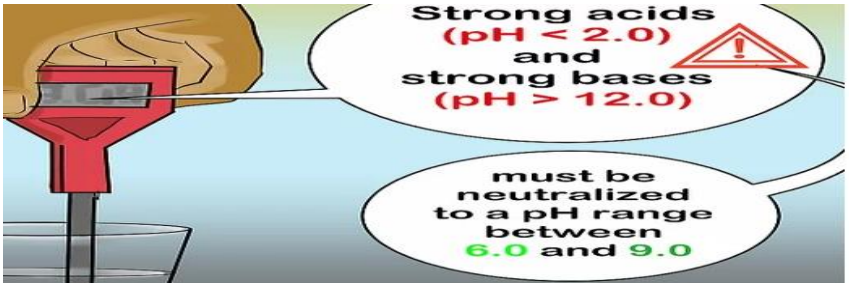

Figure 3: neutralization acid base disposal

- **Dilute by adding acid or base to water.** To dilute the solution, always add the acid or the base directly to the water. Adding water to the acid or base can superheat the water and lead to explosions.

  Diluting the acid or base is an exothermic reaction, meaning it will give off heat. Place the container in an ice bucket to avoid superheating the container. You can calculate the amount of water needed to dilute the solution based on the strength of the acid or base.

- **Pour it down the drain.** Once the solution has been neutralized and diluted, it can be poured directly down the drain. Keep the water running while you pour the solution down the drain to further dilute. If the waste contains a heavy metal such as copper, lead, zinc, cadmium, or mercury, you cannot dispose of it down the sink. It

must be disposed of as hazardous waste by an environmental health and safety office.

Self-Check 1	**Written test**

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

Short answer (3 point for each)

1. Write the three steps of Disposal of industry chemical?
2. Explain briefly Techniques of Flushing on coffee processing industry?
3. Define the word flushing?

Self-Check 2	**Written test**

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

Part 1: write short answer

1. Write the difference between COD and BOD?

Note: **Satisfactory rating - 15 points** **Unsatisfactory - below 15**

Operation sheet 1	Dispose of waste and return plant to operating condition

Operational tittle: wet and dry cleaning techniques

Objectives: to determine wet and dry cleaning methods

Procedure

a. Wet /hydraulic cleaning methods for production area

1. Ensure that all open food coffee /tea products have been removed from the area.
2. Dismantle, and remove to the appropriate hygiene area, all machine parts that require cleaning separate from the machine. Cleaning can then commence on these items.
2. Remove all containers of used paper towels to the appropriate waste product collection point.
3. Remove all unused paper towels from their containers and place them in a secure position to prevent them becoming wet and spoilt.
4. Remove all waste receptacles with waste to the appropriate disposal point .
5. Remove all loose soils and collect them into suitable containers for disposal.
6. Check and clean out all drains and drainage channels.
7. Rinse all surfaces with water and then apply a foam detergent starting at the highest point and then working downwards.
8. Leave the foam to act for a minimum of 15 minutes and afterwards clean using a pressure lance.
9. While waiting for the foam to react with surface soils commence cleaning of machines and large items which cannot be moved, including conveyors, wash hand basins, sterilizers, sinks, scales, tables etc. Commence hand scrubbing on obvious stubborn soils
10. When all surfaces have been effectively cleaned and rinsed, apply sterilant to all cleaned surfaces.
11. Ensure that all surface water has been squeegeed from floor.
12. Cleaning check sheet to be completed and signed.

b. Dry cleaning methods for coffee grinder and roaster

1. The **spice and herbs** chute is sealed off and excess coffee is ground. – Make sure you grind off as much as possible during this step, to avoid excess coffee being inside the grinder or coffee beans sitting on top of the burrs for the next step.
2. Turn off the power.
3. Remove hopper.
4. **spice and herbs** is removed and sealed in a bag. Remember to keep your unground coffee sealed off and in a cool, dark place to keep it fresh. Avoid your refrigerator though.
5. If it's a manual dosing grinder, the blades are plunged. – This is the step that cleans inside the grinder When plunging, removing a small portion of the grinds within the grinder. need to put the hopper back on and activate the grinder for a few seconds. Then repeat the above step a few times to get it really clean.
6. If it's an auto dosing grinder, grab a vacuum:
    a. Use a nozzle attachment for your vacuum. Put the hopper back on, expose the grill where the coffee drops out and hold the vacuum to it. Activate the grinder to thoroughly remove all the coffee, and persist until you can only see metal around the grill. Be aware, some vacuums won't handle this well and using a commercial vacuum is recommended.
7. Wash your hopper to remove all the chaff. Make sure you thoroughly dry the hopper before putting it back on the grinder.
8. Reassemble the grinder.

10. Wipe out the dosing chamber with a damp cloth. This is enough cleaning to see a measureable result in quality. need to disassemble the unit. For the brave and/or knowledgeable, disassembling the grinder is recommended at regular intervals (weekly to monthly) reassembly.

LAP TEST	**Performance Test**

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **2** hour. The project is expected from each student to do it.

Task-1: operate flushing process

Task-2: operate dry cleaning process

REFENCES

Books

1. Spice and herbs processing plant Guideline for the cleaning dairy plan processing equipment's
2. Marriott, N.G. and Robertson, G., 1997. Waste disposal. In *Essentials of Food Sanitation* (pp. 114-128). Springer, Boston, MA.

WEB ADDRESSES

1. FMD Design Standardshttp://www.iftsa.org/outreach/so/labs/wa/
2. http://www.iitb.ac.in/safety/sites/default/files/Machine%20Safety_0_0.pdf)
3. https://www.fda.gov/media/109408/download
4. https://www.flexiblemachining.com/pdf/quality_policy.pdf
5. https://www.slideshare.net/AbhinavVivek1/packaging-materials-for-dairy-products

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