



Republic of the Philippines
DEPARTMENT OF EDUCATION



K to 12 Basic Education Curriculum Technology and Livelihood Education Learning Module



FOOD (FISH) PROCESSING

EXPLORATORY COURSE

Grades 7 and Grade 8

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What Is This Module About?

Welcome to the world of **Food (Fish) Processing!**

This Module is an exploratory course which leads you to **Food (Fish) Processing National Certificate Level II (NC II)**¹. It covers **4** common competencies that a Grade 7 / Grade 8 Technology and Livelihood Education (TLE) student like you ought to possess, namely:

- 1) Use food processing tools, equipment and utensils;
- 2) Perform mathematical computations;
- 3) Interpret plans and drawings; and
- 4) Apply food safety and sanitation

These **4** common competencies are covered separately in 4 Lessons. As shown below, each Lesson is directed to the attainment of one or two learning outcomes:

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Lesson 1 – Use Food Processing Tools, Equipment and Utensils

- LO1. Select tools, equipment and utensils
- LO2. Use tools, equipment and utensils following standard procedure
- LO3. Perform post-operational activities

Lesson 2 – Perform Mathematical Computations

- LO1. Gather and tabulate the recorded data relevant to processed food production.
- LO2. Review various formulations
- LO3. Calculate the production input and output.
- LO4. Compute the costs of production.

Lesson 3 – Interpret Plans and Drawings

- LO1. Interpret lay-out plan.
- LO2. Perform outer packaging procedures.

Lesson 4 – Apply Hygiene and Sanitation

- LO 1. Observe personal hygiene and good grooming
- LO 2. Implement food safety practices
- LO 3. Conduct work in accordance with environmental policies and procedures
- LO 4. Participate in improving environmental practices at work

Your success in this exploratory course on **Food (Fish) Processing** is shown in your ability to perform the performance standards found in each learning outcome.

¹**NATIONAL CERTIFICATE (NC)** is a certification issued to individuals who achieved all the required units of competency for a national qualification as defined under the Training Regulations. NCs are aligned to specific levels within the PTQF. (TESDA Board Resolution No. 2004-13, Training Regulations Framework)

NATIONAL CERTIFICATE LEVEL refers to the four (4) qualification levels defined in the Philippine TVET Qualifications Framework (PTQF) where the worker with:

a. NC I performs a routine and predictable tasks; has little judgment; and, works under supervision;

b. NC II performs prescribe range of functions involving known routines and procedures; has limited choice and complexity of functions, and has little accountability;



How Do You Use This Module?

This Module has 4 Lessons. Each Lesson has the following parts.

- Learning Outcomes
- Performance Standards
- Materials
- References
- Definition of Terms
- What Do You Already Know?
- What Do You Need to Know?
- How Much Have You Learned?
- How Do You Apply What You Learned?
- How Well Did You Perform?
- How Do You Extend Your Learning?

To get the most from this Module, you need to do the following:

1. Begin by reading and understanding the Learning Outcome/s and Performance Standards. These tell you what you should know and be able to do at the end of this Module.
2. Find out what you already know by taking the Pretest then check your answer against the Answer Key. If you get 99 to 100% of the items correctly, you may proceed to the next Lesson. This means that you need not go through the Lesson because you already know what it is about. If you failed to get 99 to 100% correctly, go through the Lesson again and review especially those items which you failed to get.
3. Do the required Learning Activities. They begin with one or more Information Sheets. An Information Sheet contains important notes or basic information that you need to know.
After reading the Information Sheet, test yourself on how much you learned by means of the Self-check. Refer to the Answer Key for correction. Do not hesitate to go back to the Information Sheet when you do not get all test items correctly. This will ensure your mastery of basic information.
4. Demonstrate what you learned by doing what the Activity / Operation /Job Sheet directs you to do.
5. You must be able to apply what you have learned in another activity or in real life situation.
6. Accomplish the Scoring Rubrics for you to know how well you performed.

Each Lesson also provides you with references and definition of key terms for your guide. They can be of great help. Use them fully.



If you have questions, ask your teacher for assistance.

LESSON 1

Use Food Processing Tools, Equipment and Utensils



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO1. Select tools, equipment and utensils
- LO2. Use tools, equipment and utensils following standard procedure
- LO3. Perform post-operational activities



Definition of Terms

Assemble - means to gather or collect things together in one place.

Calibrate – means to set or determine the accuracy of the measuring device.

Check - is to examine something in order to establish its state or condition.

Dimension - is the measurement of the size of an object in terms of length, width, or height.

Equipment – things which are used to provide specific service or function.

Sanitize - means to clean something thoroughly by disinfecting or sterilizing to make it free from germs or microorganisms; disinfect.

Sanitation - refers to the process of treating tools, equipment, and utensils with physical and chemical sanitizing agents to kill residual microorganisms present after cleaning.

Disinfect - means to rid of germs; to clean something so as to destroy disease – carrying microorganisms and prevent infection.

Specification – is a detailed itemized description of dimension plans, materials and other requirements.

Standard – is a basis of comparison or established criterion.

Stowing – means arranging compactly or packing.

Brine solution - a solution of salt and water.

Brochure - a pamphlet

Catalogue - a systematic arrangement of listed items giving descriptive details.

PPT - parts per thousands

Standard - an authorized unit of weight or measure.

Operate – to make equipment function or work correctly.

Disinfect – to rid of germs; to clean something so as to destroy disease-carrying microorganisms and prevent infection .

Tools - are implements used by hand when doing an activity or work. These are devices for doing work or objects designed to do a particular kind of work, for example cutting or chopping, by directing manually applied force or by means of a motor.

Conformity – the behavior that agrees with the accepted or conventional standards.

Breakdown – is mechanical failure causing a machine or equipment to malfunction.

Check – to test the accuracy; to examine something in order to establish its state or condition.

Capacity - refers to the measurement of the amount which a device can hold or contain.

Corrosion – rusting or gradual wearing of machine parts due to a chemical reaction between substances like iron and oxygen or other corrosive materials like salt, acids, etc.

Crack – a break or fissure on some parts of an equipment as in the body of a pressure cooker.

Electrocution – death or execution from electric shock.

Inspect – to carefully examine a machine or equipment in order to determine maintenance to undertake.

Leak – a crack or hole through which a liquid or gas may accidentally pass.

Lubricant – a substance like oil or grease that coats or treats a machine to lessen friction and the wear and tear of machine parts due to constant rubbing of surfaces.

Preventive Maintenance – a system of maintenance that aims to minimize or eliminate breakdown in equipment and machinery by a program of regular inspection and repairs.

Repairs – to restore a machine or equipment that breaks down into good order or condition.

Switch – electrical device having two (2) states, ON (closed) OFF (open).

Switch – off – to turn off an electrical device.

Stow – to pack or store in an orderly way.

Troubleshooting – systematic approach to locate the cause of a fault in an electronic circuit or system.

Utensil – is an implement especially for use in the kitchen.

LEARNING OUTCOME 1

Select tools, equipment and utensils

PERFORMANCE STANDARDS

1. Appropriate tools, equipment and utensils are selected according to food (fish) processing methods.
2. Faults and defects of tools, equipment and utensils are explained.
3. Defective tools, equipment and utensils are reported in accordance with farm procedures.



What Do You Already Know?

Let us determine how much you already know about the selecting food (fish) processing tools, equipment and utensils. Take this test.

Pretest LO 1

**Let us determine how much you already know about Lesson 1
Take this test.**

Read and understand the questions below. Select the best answer for each item then write your choice on your answer sheet. Do not write anything in the Module.

1. A device used to measure the strength of brine solution is
 - a. salinometer
 - b. thermometer
 - c. both a and b
 - d. refractometer

2. What is the function of the refractometer?
 - a. Measures the sugar content of sap and syrup
 - b. Measures the temperature of the food / fish
 - c. Wraps the food / fish for processing
 - d. All of the above

3. What is used in measuring the volume of liquid?
 - a. Salinometer
 - b. Cylinder
 - c. Refractometer
 - d. Thermometer

4. A standard measuring instrument used in fish processing is
 - a. Salinometer
 - b. Refractometer
 - c. Thermometer
 - d. All of the above

5. What type of water is used in calibrating the refractometer?
 - a. Distilled water
 - b. Sea water
 - c. Water from the faucet
 - d. Brackish water

6. A device used to measure the temperature of fish / food is
 - a. Thermometer
 - b. Salinometer
 - c. Refractometer
 - d. Beaker

7. A device used to measure the weight of fish / food is
 - a. Thermometer
 - b. Weighing scale
 - c. Measuring cup
 - d. Measuring spoon

8. How many drops of sap or syrup sample are needed in testing the refractometer?
 - a. one
 - b. two
 - c. three
 - d. four



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

Equipment, Tools and Utensils: Uses of Specifications

Every equipment, tool and utensil that are purchased are accompanied with a manual containing specifications as to how they are used, manipulated or operated, cared for and stored to lengthen their serviceability. Specifications usually include the following:

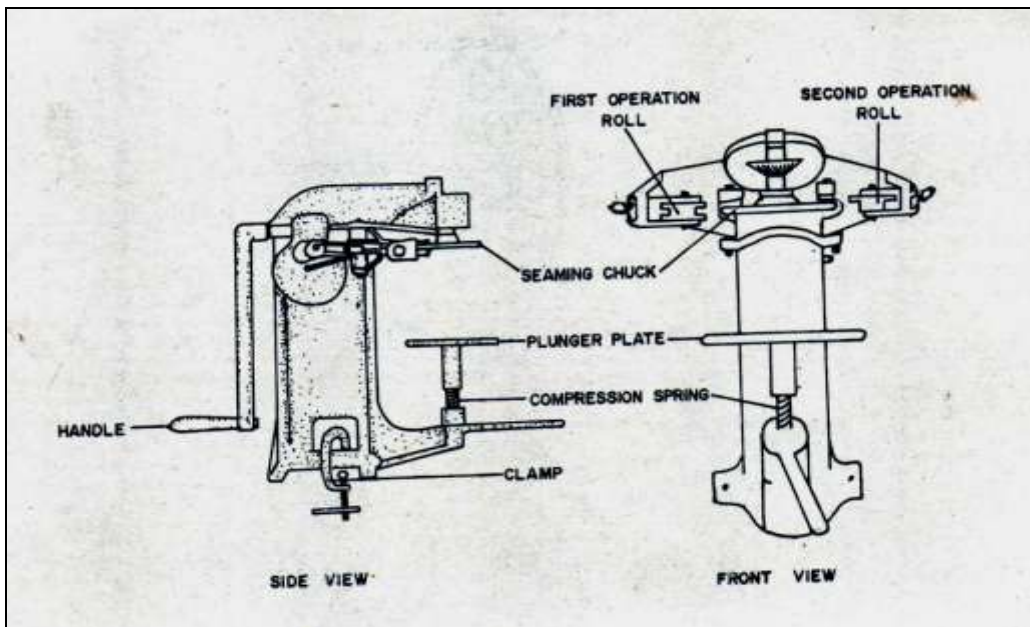
1. Important safeguards or basic safety precautions to follow when using the device like a pressure cooker for instance.
2. Warning labels which serve as a reminder to the user to read and follow instructions on the proper use and operation of a certain device equipment or tool.
3. Dimensions, weights and capacities as in the case of cookers, boilers and steamers.
4. Instructions on caring for the equipment, tool or utensil.
5. Instructions on the correct usage of the device.

When using any equipment, tool or device it is important to read and understand the manufacturer's specifications in order to properly or accurately use or manipulate them and prevent any accident that may occur due to ignorance or lack of information pertaining to their correct usage. Being familiar with all information pertaining to food processing equipment results to systematic, orderly and accurate accomplishment of tasks.

Parts and Functions of Equipment, Tools and Utensils

Knowing the parts and functions of equipment, tools and utensils used in processing food ensures accurate or proper use, operation and care for them. It is very easy for a food processor to manipulate a particular device if he knows all its parts and their respective functions. Proper maintenance for the parts of any tool, equipment and utensil can also be done if a processor is familiar with them.

The Can Sealer



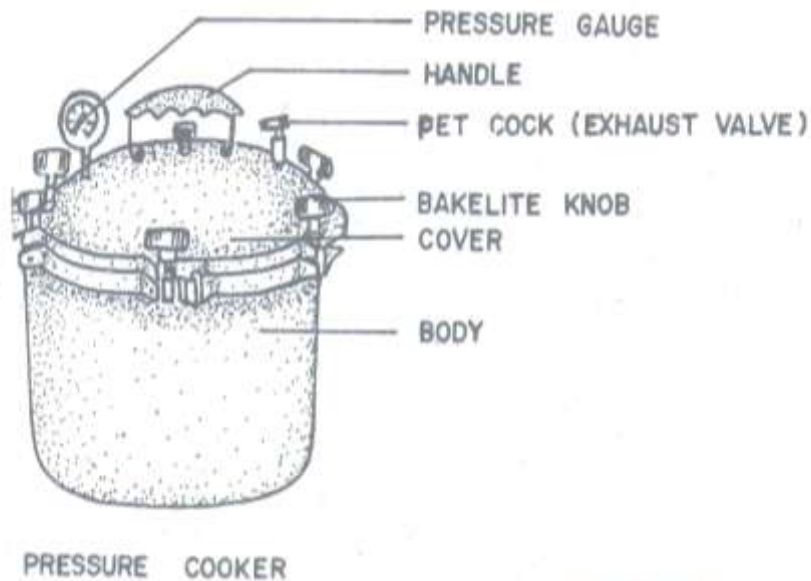
The can sealer is an equipment used to seal tin cans with its first and second operation rolls.

Some processed food products are usually packed in tin cans which are mechanically sealed with a can sealer. Below are the functions of some parts of an automatic can sealer:

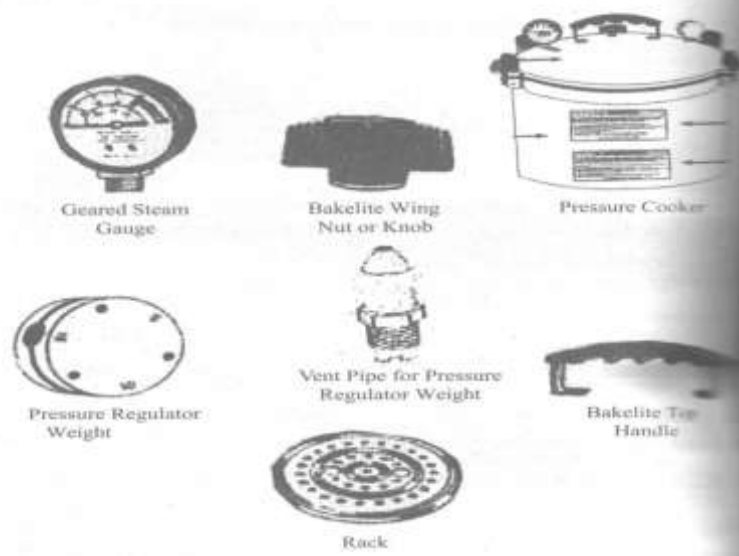
1. **Clamp.** This fastens the sealer on the table or arm chair and holds it tightly in place, especially during operation.
2. **Base plate or plunger plate.** Its function is to hold the base of the can. It has grooves to fit the can base wherein these grooves coincide the can size.
3. **Can lifter handle.** It is used to raise the base plate so that the can cover will reach up to the chuck and lower the base plate so that the can cover will reach up to the chuck and lower the base plate when sealing is through.
4. **Crank.** This part is turned during the sealing of can seams both first and second operation rolls.
5. **First operation roll.** It is used to clinch, partially or half – seal the seams of a can cover.
6. **Second operation roll.** It is used to complete – seal the seams of a can cover.
7. **Seaming roller pin – first.** It is placed on the hole of the first operation roll to fasten on it.
8. **Seaming roller pin – second.** It is placed on the hole of the second operation roll to fasten on it.
9. **Rivet.** This part is placed in the hole of the adjusting lever which coincides the can cover size. If can cover size is No. 2, for instance, one – half pound tuna can rivet is placed in No. 2 hole of the adjusting lever. Rivet is also called adjusting pin.
10. **Chuck.** It is used to hold the cover of the can while sealing is going on. Chuck has many sizes, namely Number 1, 2, 2 ½, and 3, respectively. If No. 2 cover is used, hence, hence, chuck No. 2 is used.
11. **Height washers.** These washers are placed in base plate shaft to match the height of the can when lifted up to the chuck.
12. **Adjusting levers.** There are two adjusting levers, one for the first operation roll and the other, second operation roll. There are numbered holes on these levers wherein rivets are placed to coincide the can size.

13. **Base compression spring.** It acts as cushion while sealing is on the process.
14. **Base plate shaft.** This is the part where compression spring and height washers are inserted.

The Pressure Cooker



Pressure Cooker and Its Parts



A pressure cooker is an important canning equipment used to process fish packed in a hermetically sealed container at a high controlled temperature and pressure for a certain period of time. Some of its parts and their functions are as follows:

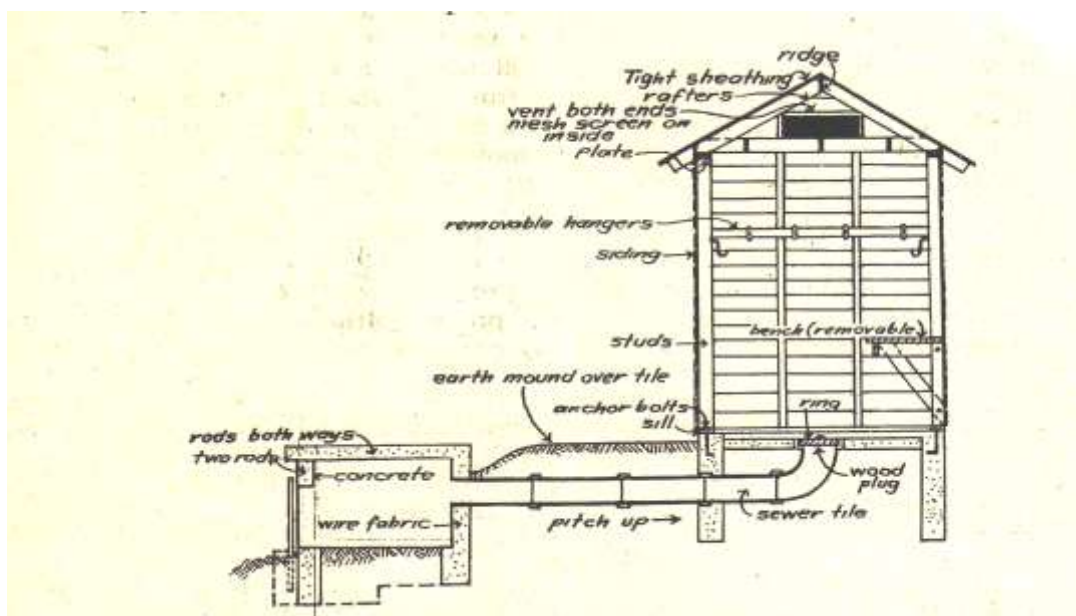
1. **Geared seam gauge or pressure gauge.** It indicates the pressure and temperature inside the cooker while processing.

2. **Pressure regulator weight.** It is used to close the vent pipe and regulate the accumulated pressure inside the cooker while processing. It contains holes which correspond to the desired pressure directly over the vent pipe. For instance, if the desired pressure is 10 pounds, the pressure regulator weight hole of 10 is inserted over the vent pipe.
3. **Vent pipe for pressure regulator weight.** It is where the pressure regulator weight is placed. It releases steam when opened.
4. **Bakelite wingnut or knob.** It is used to securely fasten the cover of the cooker to its body.
5. **Arrowhead and arrowline.** They indicate if the cover is properly seated on the body.
6. **Automatic pressure control.** It consists of the vent pipe and pressure regulator weight. It automatically controls the pressure inside the cooker while processing.
7. **Overpressure plug.** It automatically vent or release steam if the vent pipe becomes clogged.
8. **Cover.** Seals the body of the cooker during processing.
9. **Body.** It holds the water for processing and the metal rack where the canned products are placed during processing.
10. **Bakelite top handle.** This is for holding the cover when lifting it away from the body or seating it properly on the body.
11. **Body or side handles.** This is used for holding the body of the cooker when transferring it from one place to another.

The Smokehouse

A smokehouse is a device used in treating the fish or meat with smoke. It can be a cold smoke house or a hot smokehouse. It is a hot smokehouse if the fish is in close proximity to the source of smoke and a temperature of 66°C to 88°C is produced. If the source of smoke is 2 meters away from the fish and the temperature of smoke is 32°C – 43°C, then it is a cold smokehouse. Some are simple like the barrel and drum types while others are mechanized and controlled like the Torry smokehouse which can also be used as a drier.

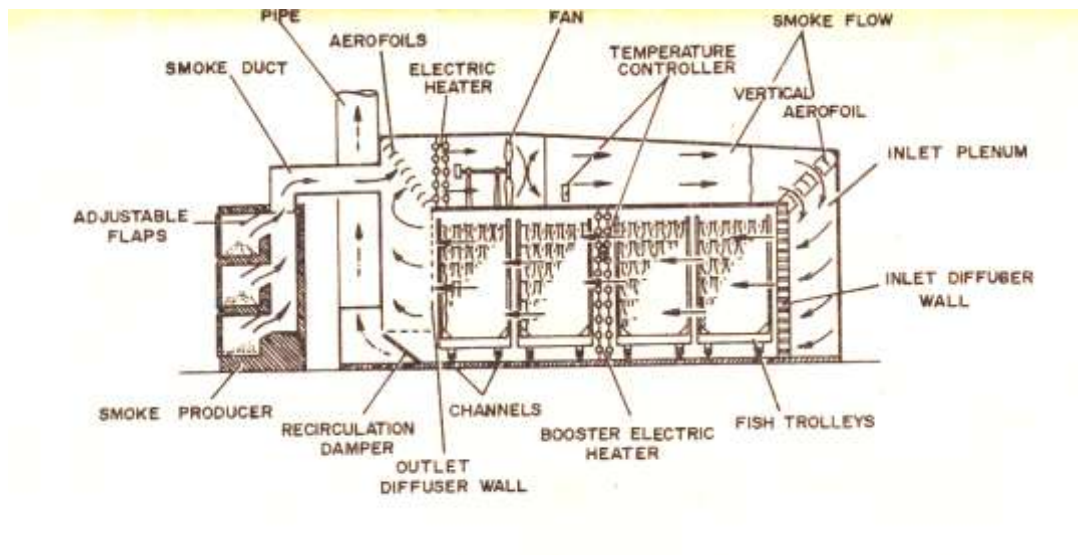
The Drier Smokehouse



The Parts of a Drier Smokehouse and their Functions

1. **Removable slatted benches.** They hold the fish to be smoked.
2. **Removable hangers with hook.** They are used for hanging fish to be dried or smoked.
3. **Wooden hooks.** They are nailed from the top of a the drier smokehouse where fish are also hanged when drying or smoking.
4. **Vents.** These are located below the roof at the front and back of the smokehouse to provide the necessary air circulation.
5. **Tunnel or pipe.** Conveys the smoke from the concrete furnace into the smokehouse.
6. **Concrete furnace.** It is where the smoke – producing materials are placed and burned.
7. **Tight sheathing rafters.** Serve as the top cover or roofing of a smokehouse.
8. Meshed screen. Serve as a closure to openings like the vents to keep flies and insects from entering the smokehouse.

The Torry Smokehouse and Its Parts



Some Types of Smokehouse

1. Stainless Steel Smokehouse
2. Electric Smokehouse



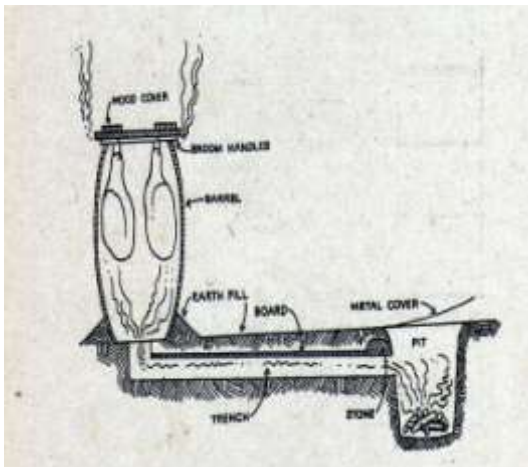
3. Mechanical Smokehouse



Smokehouse control and sensor of an electric smokehouse

4. Barrel Type Cold Smokehouse

5. Brick Smokehouse



The Freezer and Refrigerator

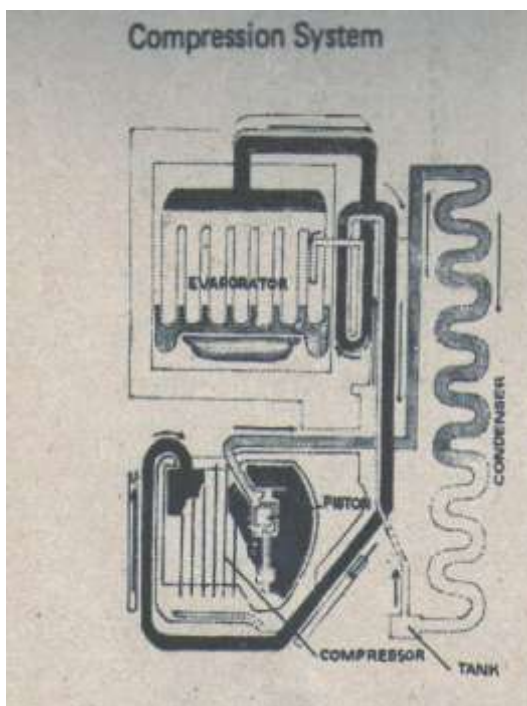
The freezer and refrigerator are used in maintaining the freshness of raw materials and in providing an ideal low or ambient temperature for storing processed foods.



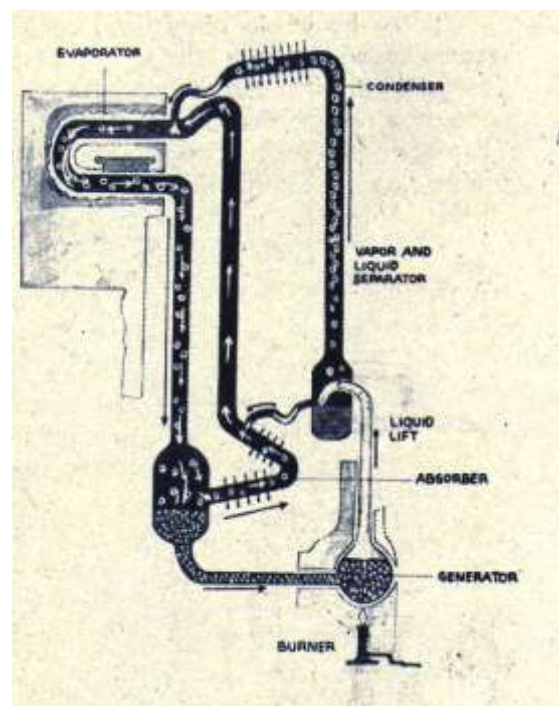
Freezer for Fish



A Two – Door Refrigerator



Compression System of Refrigeration



Absorption System of Refrigeration

The Parts of the Compression System of Refrigeration and their Functions

In a refrigerator, the heat evolved by the compression of a gas in the **compressor** is removed by **condensing coils**. Still under pressure, the gas cools and condenses into a liquid at the **condenser which** is released through a **control valve** into the **evaporating coils** of the freezing compartment. As the pressure is removed, the liquid refrigerant turns into a gas (vaporizes), causing a sharp lowering of temperature.

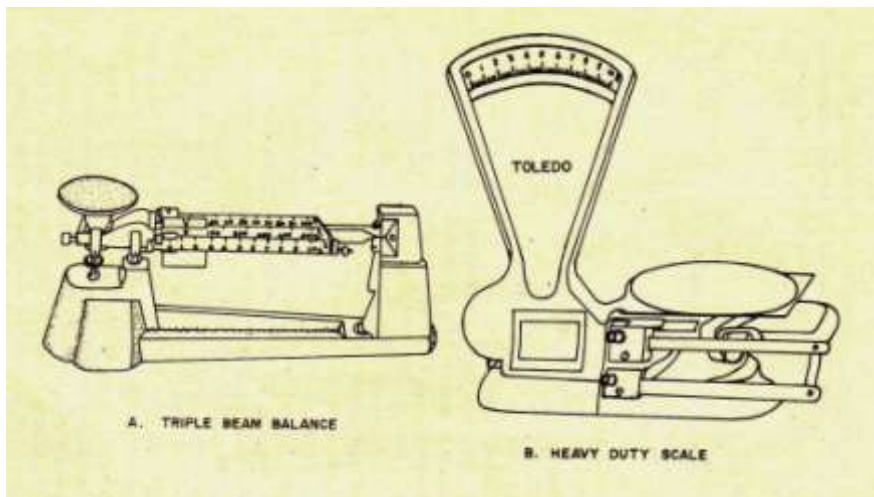
The Parts of the Absorption System of Refrigeration and their Functions

In this system, a small burner flame provides heat which drives out the gas from the ammonia – water mixture. It utilizes an insulated box to keep the cold in and an evaporating gas or refrigerant. A mixture of ammonia passes through the evaporating coils of the freezing compartment where it evaporates into ammonia gas. The evaporation of ammonia removes heat from the food. The ammonia gas then goes down to the absorber where it is absorbed by water. A small amount of heat from the burner flame drives out the gas from the ammonia – water mixture and condenses back into liquid ammonia as it passes through the condensing coils.

Tools and Utensils Used in Food Processing and their Uses

1. Measuring Devices

a. Weighing scales



The **triple beam balance** is for measuring small quantities like spices, preservatives, etc., while the heavy duty scale is for measuring fish, salt, etc.



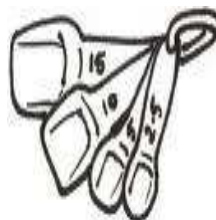
Checkweigher scale is a digital weigher scale used to get the weight of food like meat, fish, vegetables, fruits, etc.



Clock Type weighing scale for food

b. Measuring spoons

A **measuring spoon** is a spoon used to measure an amount of a substance, either liquid or dry, when cooking. Measuring spoons may be made of plastic, metal, etc.



c.

A **measuring cup** is a kitchen utensil used primarily to measure the volume of liquid or powder-form cooking ingredients such as water, milk, juice, flour,

etc. Measuring cups can be in plastic, glass and stainless. From mini shot measure to measuring pitcher and batter bowl.



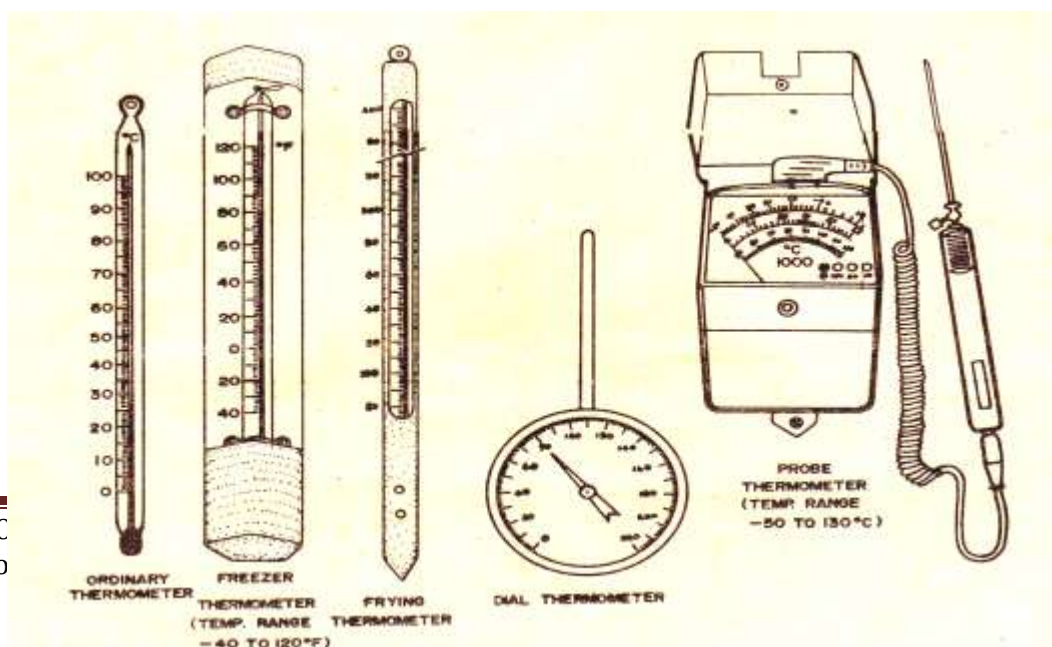
Measuring cups for measuring liquid ingredients like milk, vinegar, fish sauce, etc.



Measuring cups for solid ingredients like flour, salt, minced garlic, etc

c. Thermometers

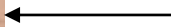
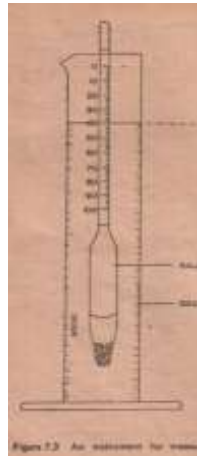
Thermometers indicate the degree of hotness or coldness of a thing or body. It measures how high or how low the temperature is.



d. Glass Tube Thermometers



e. Salinometer



It is used to measure the salinity of a brine.



f. Psychrometer

It is used to measure the relative humidity of the air when sun drying.



Digital Sling Psychrometer

f. Anemometer

It is used to determine the velocity of the wind in sun drying.



g. Refractometer – used to measure the sugar concentration of sap and syrup for food.



2. Cutting Implements

a. Knives



For cutting or slicing fish or meat; for scaling fish

b. Filleting knives



For filleting fish

c. Scissors



For trimming – off fins of fish

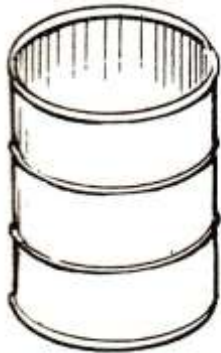
3. Descaler or scalers

They are used in removing the scales of a fish.



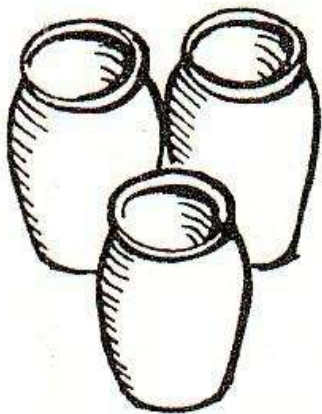
Electric Fish Scalers

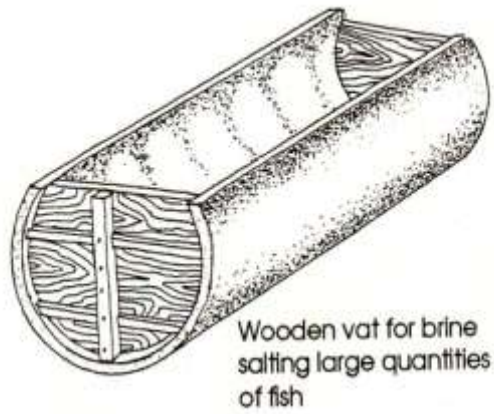
Salting Equipment



Oil drum – used as a container to keep salted fish during the process

Earthen pots are used in storing the salted products.





Wooden salting vat is a container used in the salting process.



Wooden shovel or spade is used for mixing or stirring the mixture of salt and small fish for salting

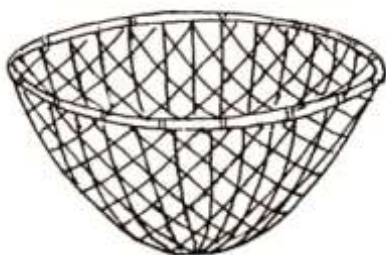
5. Smoking Equipment



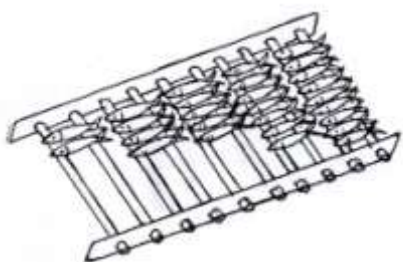
Baklad made of bamboo used in drying the fish prior to smoking



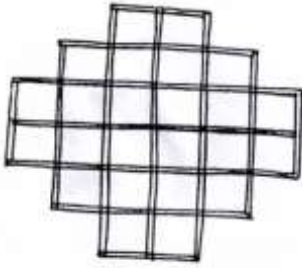
Bakol is a bamboo basket used to transport smoked



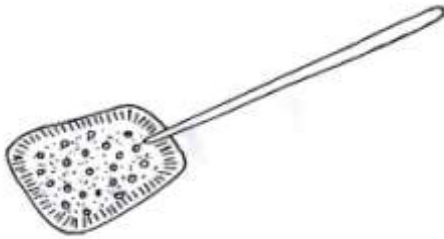
Bistay is a bamboo basket for collecting sun dried fish



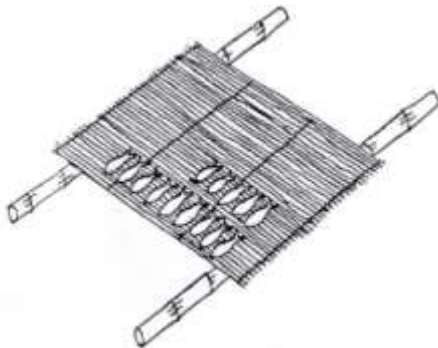
Dinarayan is a smoking tray
made of wood



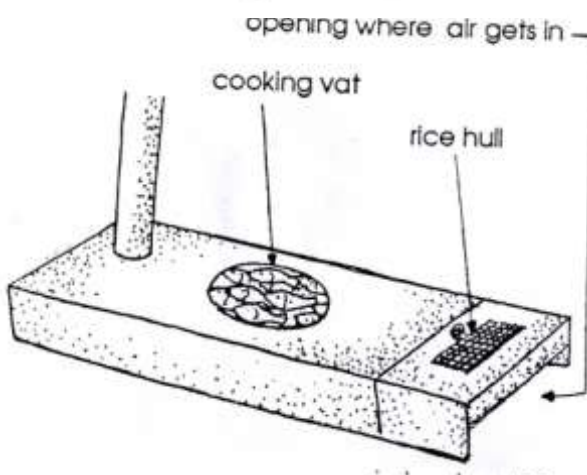
Panakip is a bamboo cover used to keep fish submerged in the brine while boiling



Panandok is a big metal ladle to scoop up the cooked fish from the boiling brine



Bamboo poles used to hold the baklad
With brine cooked fish while drying.



Pugon is a concrete heat source used when pre-cooking fish in a brine

6. Others



For picking up or handling food



It is where fish or meat are cut; ingredients are sliced or minced.



How Much Have You Learned?

Self-Check 1.1

Identify the following. Write your answer on the space provided for.

- _____ 1. It is a device used to measure the strength of brine solution.
- _____ 2. It is a device used to Measures the sugar content of sap and syrup.
- _____ 3. It means to set or determine the accuracy of the measuring device.
- _____ 4. It is the cheapest and most easily available sanitizer in the market.
- _____ 5. It is used in measuring the volume of liquid.
- _____ 6. It is a device used to measure liquid ingredient in small quantity.
- _____ 7. It is the type of water used in calibrating the refractometer.
- _____ 8. It is a device used to measure the temperature of fish/food.
- _____ 9. It is a device used to measure the weight of fish / food.
- _____ 10. How many drops of sap or syrup sample are needed in testing the refractometer?
- _____ 11. It is use for cutting or slicing fish or meat; for scaling fish.
- _____ 12. It is use for trimming of fins of fish.
- _____ 13. It is use for picking up or handling food.
- _____ 14. It is where fish or meat are cut; ingredients are sliced or minced
- _____ 15. It is use in storing the salted products.

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 2

Use tools, equipment and utensils.

PERFORMANCE STANDARDS

1. Printed procedures/ brochures/ catalogues are consulted and reviewed according to specified food processing methods.
2. Standard procedures in using tools, equipment and instruments are recalled and strictly followed according to manufacturer's specifications
3. Devices and instruments for measuring are properly checked, sanitized and calibrated prior to use.
4. Tools, equipment and instruments are safely used according to job requirements and manufacturers' specifications.



Materials

- refractometer cover
- soft tissue paper or a cotton cloth
- salinometer
- blender
- outlet
- weighing scale and balance
- measuring cups of varying capacities
- measuring spoons
- thermometer
- cylinder
- beaker
- flasks



What Do You Already Know?

Let us determine how much you already know about the use fish processing tools, equipment and utensils. Take this test.

Pretest LO 2

Directions: Carefully read the questions below. Select the best answer from the options given and write the letter only on your answer sheet.

1. Why is it important to review all procedures in using standard measuring devices?
 - a. To ensure proper use of standard measuring devices
 - b. To enable a food processor to use the appropriate measuring device
 - c. To enable a food processor to work systematically and accurately
 - d. All of these.

2. Your teacher instructed you to measure the salinity of brine you will use in curing fish. Which of these will you do?
 - a. Recall and master the procedure in using a salinometer
 - b. Review and master the procedure in using the thermometer
 - c. Review the procedure in using a psychrometer
 - d. Review the procedure in using a refractometer

3. You were assigned to monitor the temperature of smoke inside the smokehouse. What will you do to correctly perform your assigned task?
 - a. Recall and master the procedure in using a weighing scale
 - b. Review the procedure in using a refractometer
 - c. Review the procedure in using a thermometer
 - d. Master the procedure in using a salinometer

4. What would happen if you failed to follow the correct procedure in measuring liquid?
 - a. The obtained measurement is inaccurate
 - b. The work is not properly done
 - c. Both a and b
 - d. None of these

5. Which procedure will you master if you want to measure the sugar concentration of a fresh sap or syrup?
 - a. How to use a thermometer
 - b. How to use a salinometer
 - c. How to use an anemometer
 - d. How to use a refractometer



What Do You Need To Know?

Read the Information Sheet 2.1 ,2.2 and 2.3 very well then find out how much you can remember and how much you learned by doing Self-check 2.1, 2.2 and 2.3.

Information Sheet 2.1

Inspecting and Checking Condition of Equipment and Machines (USE)

Before any equipment or machine is used, it must first be checked to make sure that it is very functional and in good condition. Checking and inspecting equipment and machines will guarantee that all their parts are in tact and that no part is missing or defective. This will also assure that electrical plugs and wirings are not defective and will not in anyway cause problems on short circuits, electrocution or any form of accident. Religiously checking and inspecting equipment and machines will facilitate **Preventive Maintenance** which include checking the following:

1. Machine temperature
2. Hydraulic fluid
3. Wear and surface condition
4. Crack
5. Leak detection
6. Vibration
7. Corrosion
8. Electric insulation

Performing pre – operation activities ensures that all the tools, equipment and utensils assembled, checked, inspected, sanitized, readied and stowed after use are the appropriate devices required in processing the food based on the method of processing that will be undertaken like salting, curing, smoking, fermentation, pickling, canning, bottling, processing using sugar, drying, and dehydration or artificial drying. Doing this will prevent the use of inappropriate devices as well as well as the occurrence of accidents due to the use of faulty or defective tools, equipment and utensils.

Sanitizing and disinfecting the tools, equipment and utensils will destroy all germs and microorganisms which were not removed after washing with soap and water. Proper cleaning and disinfecting leads to:

1. Minimizing product rejection, return and complaints due to defects resulting from the use of defective or inappropriate tools, equipment and utensils
2. Lengthening product shelf life due to the reduction of contamination resulting from the use of properly sanitized and disinfected tools, utensils and equipment
3. Reduction of the risk on food poisoning due to the use of unsanitized tools, equipment and utensils.

4. Facilitating preventive maintenance which include checking the machine temperature, hydraulic fluid, wear and surface condition, crack, leak detection, vibration, corrosion, and electric insulation.

B. Cleaning and Sanitizing Equipment and Instruments

The use of sanitizing agents leads to effective sanitation of tools, equipment and utensils. Sanitation with the use of physical and chemical sanitizing agents will kill residual microorganisms that remain after cleaning. Cleaning by washing with soap and water is very important as it ensures the removal of dirt or debris by physical and/or mechanical means. Clean water is to be used to finally wash and rinse all utensils, tools and equipment. Sanitizing or disinfecting, on the other hand, rids or reduces the number of micro-organisms on surfaces where food comes in contact with. It cannot be accomplished until surfaces where foods are processed are clean. Moreover, it cannot be effective without a good pest control program.

Cleaning alone by washing will not be capable of totally eradicating microbes, germs and viruses, hence the need to use sanitizing agents. Some sanitizing agents are detergent solution for scrubbing surfaces of processing tables, 150 – 200 ppm chlorinated water for sanitizing. All tools and utensils are also cleaned and sanitized with the use of detergent solution rinsed with tap water before sanitizing with 150 – 200 ppm chlorinated water by soaking.

Chlorine is one of the cheapest and most easily available sanitizers in the market. It is popularly used in the treatment of water for both household and plant. Likewise, chlorine is also used to sanitize processing equipment.

Area / Materials to be Sanitized	Volume of Water	Volume of Chlorine	Time (Minutes)
Hand Dip	5 gallons	10.8 ml	2-5 minutes
Equipment	5 gallons	54 ml	2-5 minutes
Floor	5 gallons	125 ml	20 minutes
For food processing: Washing of vegetables and poultry	5 gallons	27 ml	2-5 minutes

1. Procedure in Cleaning Equipment and Instruments
 - a. Wash all the equipment / instruments with soap.
 - b. Rinse with clean water.
 - c. Sanitize by dipping into approved sanitizer solution.
 - d. Remove from the solution.
 - e. Allow to air dry.

2. Procedure in Sanitizing:
 - a. Prepare all the materials needed.
 - b. Measure a certain amount of chlorine and water.
 - c. Mix and dip the equipment / instruments in the mixture.

- d. Remove from the sanitizing solution.
- e. Dry thoroughly.

Calibrating Measuring Devices and Instruments

1. Procedure in Calibrating
 - a. Weighing Scale
Check the accuracy, see to it that the hand is pointed at zero in an empty weighing scale.
 - b. Salinometer
Check the accuracy by measuring 20°salinometer brine solution.
Checkif the salinometer records the reading correctly.
 - c. Refractometer
Place a drop of water (preferably distilled) in the dark circular orrectangular area and close the cover. A shadow or dark area is visible on the scale inside the eyepiece. Turn the calibration screw until the shadow falls on the zero mark. Open the refractometer cover and dry the cover and glass prism using soft tissue paper or a cotton cloth.
 - d. Thermometer
Check the accuracy by dipping it in hot food to see if the mercury rises to desired temperature.

Proper Stowing of Tools, Equipment and Utensils

Tools, equipment and utensils must be properly stowed in order to protect them from rusting, contamination, etc. and thus lengthen their serviceability. They must be kept in clean cabinets which are well – ventilated and not subjected to drafts or rain.

Tools and utensils which were washed must be drained and wiped – dry before keeping them. They are kept in an orderly way in order that it will be easy to assemble or prepare them when needed. The cabinets or racks where they are kept must be properly labeled for easier identification on the part of the user.

Procedure:

1. Wash the equipment/instruments with soap.
2. Rinse thoroughly with clean water.
3. Sanitize by dipping or soaking in a sanitizing solution.
4. Rinse with clean water.
5. Drain.
6. Dry thoroughly (Air Dry).
7. Wipe with a clean piece of cloth.
8. Check the accuracy of the equipment/instruments.
9. Pack/store/keep in a clean dry cabinet.

Procedure in Cleaning, Sanitizing, Calibrating and Stowing Equipment and Instruments

1. Wash the equipment / instruments with soap.
2. Rinse with clean water.

3. Sanitize by dipping or soaking in sanitizing solution.
4. Remove from the sanitizer solution.
5. Rinse with clean water.
6. Dry thoroughly (air dry).
7. Check the accuracy of each equipment and instruments.
8. Pack and keep in a clean cabinet.



How Much Have You Learned?

Self-Check 2.1

Directions: Carefully read the questions and choose the best answer from the options given. Write the letter only of your answer in your test booklet.

1. What are some of the specifications included by the manufacturer of a certain tool, equipment or utensil?
 - a. dimension as to size, height, capacity, etc.
 - b. handling and operating requirements
 - c. proper care and maintenance
 - d. all of these
2. Why are specifications for food processing tool, equipment and utensils necessary?
 - a. because they provide information to the user as to how they must be properly handled and operated in order to avoid accident
 - b. specifications give information concerning the proper use, care and maintenance of the tools, equipment and utensils
 - c. both a and b
 - d. specifications provide information about the tools, equipment and utensils
3. If you are a food processor, why do you need to know the parts of the equipment, tool and utensil and their functions?
 - a. to appreciate the usefulness of a particular device
 - b. to be able to correctly operate/manipulate a tool, equipment or utensil
 - c. to be able to do some simple repairs on them
 - d. to easily determine if a part is missing
4. If you are going to pack processed foods in tin cans, why do you need to seal it with a can sealer?
 - a. cans cannot be sealed manually
 - b. tin cans are difficult to seal
 - c. to properly seal them
 - d. a can sealer is the appropriate equipment for attaching the cover to the body of a tin can with its first and second operation rolls
5. What will help you determine the kinds of tools, equipment and utensil you will assemble, sanitize, inspect or check?
 - a. the kind of product to be produced
 - b. the method of food processing to be done
 - c. the raw materials to be processed
 - d. the availability of tools, equipment and utensils

6. You have already removed the dirt from the tools, equipment or utensils you will use in processing the food by washing them with soap and water. Why do you still need to sanitize or disinfect them?
 - a. washing with soap and water only removes the adhering dirt
 - b. washing alone cannot remove the microorganisms and germs
 - c. to effectively kill or destroy all the germs and microorganisms which remained after washing
 - d. all of these
7. Which of these is a sanitizing agent you can use for killing the germs and microorganisms present in tools, equipment and utensils?
 - a. sodium chloride
 - b. sodium hypochloride
 - c. magnesium sulfate
 - d. calcium chloride
8. How will you properly store tools, equipment and utensils after using them?
 - a. wipe dry all tools, equipment and utensils which were washed with water before keeping them
 - b. stow them in a clean dry place with a good ventilation
 - c. apply lubricant to parts of equipment that undergo friction to prevent wear and tear
 - d. all of these
9. Why do you need to inspect and check the condition of equipment and machines before operating them?
 - a. to check if no parts are defective or missing
 - b. to check if electrical plugs are in good condition
 - c. both and b
 - d. to see if they are old or new ones
10. Which of this preventive machine maintenance will you check before using equipment or a machine?
 - a. machine temperature and hydraulic fluid
 - b. wear and surface condition
 - c. crack and leak detection and electric insulation
 - d. all of these

Refer to the Answer Key. What is your score?

Procedures in Using Standard Measuring Devices and Instruments

1. Salinometer

- a. Prepare brine solution.
- b. Pour brine solution in a cylinder.
- c. Dip salinometer in brine solution.
- d. Record the reading.
- e. Clean instrument after using.

2. Thermometer

- a. Dip thermometer in boiling liquid.
- b. Record the reading by $^{\circ}\text{C}$ or $^{\circ}\text{F}$
- c. Clean after using.

3. Refractometer

- a. Place a drop of fresh sap or syrup sample on the refractometer.
- b. Close the cover.
- c. Quickly read the scale (the line on the top of the darker area). Readings should be taken to the nearest 0.1 percent.
- d. Rinse with water after each reading and dry with tissue paper.

4. Glassware like cylinder, beaker, flask

- a. Pour liquid ingredients into the cylinder, beaker, or flask.
- b. Bring the cylinder to eye level.
- c. Get the reading at the lower meniscus.
- d. Record the reading.
- e. Clean after using.

5. Weighing scales

Put the food on the weighing scale. Record the reading in grams or kilograms.

6. Measuring cups for dry ingredients

Gently spoon the ingredients into the cup, filling the cup to overflowing. Then level off with a metal spatula or straight-edged knife.

7. Measuring cups for liquid ingredients

Pour liquid on level surface of measuring cups. Have the measuring lines at eye level to be sure of the exact measurement.

It is important to review all procedures regarding the use of all standard measuring devices to ensure that they will be properly used in accordance with manufacturer's specification.

Being familiar with the procedure in using a standard measuring device like a salinometer, thermometer, weighing scale or a measuring cup or spoon will enable a food processor to

use the appropriate measuring device for a specific food processing activity. It also enables him to work systematically and accurately.



How Much Have You Learned?

Self-Check 2.2

Complete the statements by writing your answer on the space provided.

1. _____ is the behavior that agrees with the accepted or conventional standards.
2. _____ is formed by design or invented for specific use.
3. _____ means to divide into or mark with degrees.
4. _____ refers to a place where any work is carried out.
5. _____ is a solution of salt and water.
6. _____ means a systematic arrangement of listed items giving descriptive details.
7. _____ are things that provide specific service or function
8. _____ is a tool or utensil.
9. _____ is a pamphlet.
10. _____ is used as a basis of comparison or established criterion.

Refer to the Answer Key. What is your score?

Equipment are the tools, supplies and other items needed for a particular task. When processing food, there are several equipment that are to be used. These include the following:

1. cooking equipment like ovens and steam – jacketed kettles
2. refrigeration and low temperature – storage equipment like refrigerators and freezers
3. cutting implements like slicers, mixers, grinders and choppers, etc.

A food processor, however, must know the essential information regarding the equipment in terms of how they must be operated or used in accordance with the manufacturer's specifications.

Before operating any equipment, it is important to be familiar with the manufacturer's specifications, which include:

1. Handling requirements
2. Operating requirements
3. Discharge label
4. Reporting
5. Testing
6. Positioning
7. Refilling

Interpreting Manufacturer's Specifications

Food processing equipment when sold are provided with a manual containing the manufacturer's specifications and a necessary reminder to the processor in the form of a sticker or Warning Label is attached to the equipment itself as an assurance that the equipment/machine or tool is in excellent condition for it has passed quality control in its construction.

The specification usually gives a detailed description about the equipment, dimensions, materials, and other relevant information regarding the equipment or machine.

The dimension gives the measurement of the size of an object in terms of length, width, or height of the equipment/machine or tool.

The capacity specifies the measurement of the amount, which a device can hold or contain as in boilers, cooker, or steamers or a weighing scale.

The manufacturer's specifications are usually contained in the manual, which accompanies the equipment. The food processor must thoroughly read and understand all the information contained in the manual especially if the equipment is to be operated electrically. Aside from knowing the correct operation of the equipment or machine, it is also important to know this information:

1. Basic safety precautions to follow when using the equipment
2. Warning labels which specify how to properly operate an equipment
3. Instructions on the proper care of the equipment/machine
4. Instructions on the correct operation of the equipment

The manufacturer's specifications must be thoroughly read and understood by the food processor and sees to it that he interpreted them in such a way that a food processing equipment can be properly operated.

Below are some examples of manufacturer's specifications, which must be properly interpreted resulting to an accurate and safe operation/manipulation of an equipment/machine:

Directions for Use of the Hydrometer

1. Clean the hydrometer thoroughly and dry it before using it each time. Handle with clean dry hands or with clean cloth.
2. Use with fluid juices, otherwise if the liquid to be tested is thick or slimy, the resting point of the hydrometer will be uncertain.
3. Pour a small quantity of the juice into a glass cylinder and drop the hydrometer carefully.
4. Make sure that the instrument is floating freely and touches neither the bottom nor the sides of the cylinder.
5. To read correctly, set eye level with the surface of the liquid.
6. Since the specific gravity of juices varies with temperature, bring the juice to the standard temperature for which the hydrometer is adjusted usually 16°C or 60°F or make the necessary corrections in the reading. Add 0.1% for every 3° above the standard and subtract 0.1% for every 3°.

Tips on the Proper Use and Care of a Refrigerator

1. Put only clean food in the refrigerator.
2. Put only clean containers in the refrigerator. Wipe before refrigerating them.
3. Keep the refrigerator closed.
4. Keep fatty substances and hands off the rubber seal or gasket of the refrigerator door. A gasket kept in good condition seals the cold air in the refrigerator.
5. Wash and clean the refrigerator once a week with warm water to which a little baking soda has been added. This is prepared by mixing one teaspoon of baking soda per quart of water. The exterior should be washed with soap and water and then rinsed and dried. Avoid the use of abrasives.
6. Remove ice cubes by letting cold water run over them in the ice – cube pan. Removing them with an ice pick is liable to puncture the pan.
7. Defrost the refrigerator as follows:
 - a. Turn – off the freezing unit
 - b. Refill the ice cube pan with warm water not hot water, and place it on the bottom of the shelf of the freezing unit
 - c. Keep the drip tray in place to catch the melting ice that drops off
 - d. Wash and refill the ice cube
 - e. Wash the refrigerator and the drip pan. Never try to speed up defrosting by prying – off ice.
 - f. When done, turn the freezing unit on.

General Directions for Using Pressure Canners for Fruits and Vegetables

1. Assemble materials and equipment. Pressure should be thoroughly cleaned with soap and water.
2. Check jar rings and closures. Wash and rinse thoroughly.
3. Have plenty of boiling water available.
4. Sort food for size and degree of ripeness.
5. Pour hot water into washed jars until needed.
6. Follow specific directions for best results.
7. Preheat or precook food as per recipe.
8. Place 2 quart of boiling water in cooker with basket in place. Set cooker on heat.
9. Place clean, sterile rubber rings on jar or cover as directed, when closure requires separate rings. Return jars to hot water until ready to fill.
10. Fill hot containers promptly with hot food according to given directions.
11. Fill jar to proper level with boiling liquid when recipe so requires. Don't fill the container up to the top but allow space for any expansion. All equipment used should be clean.
12. Work out bubbles with a clean knife or spatula. Wipe sealing edge with clean wet cloth.
13. Adjust closures on jars according to directions for types of closures used. If bottles are used, close tightly and then turn back by $\frac{1}{4}$ inch.
14. Place each hot container inside the pressure canner. Do not have these containers in direct contact with pressure – canner bottom or sides.
15. Put cover on cooker and lock in closed position. Use maximum heat under it.
16. Watch for steam to come from the petcock. Petcock valve should be opened wide. Under no conditions should pressure be raised in the cooker until it is in exact position.
17. Allow steam to come out freely for 7 – 10 minutes to eliminate all air pockets. Close petcock.
18. Use maximum heat to raise pressure to required point and then lower heat to maintain the pressure desired. Start counting processing time the moment required pressure is reached. To eliminate fluctuations in pressure, pressure cooker should be kept at required point by raising or lowering the heat as needed.
19. Turn off heat at end of processing time or move cooker from heat at end of processing time when using electric stove or any other constant heat unit.
20. When canning in glass jars, allow pressure to return to zero of its own accord. When indicator reaches zero, let cooker cool for 2 – 3 minutes.
21. Open petcock. Remove cover from cooker. Under no circumstances should its cover be turned until dial on the steam gauge points to zero. Lift cover so steam is away from you.
22. Immediately toss dishtowel over cooker and containers. Let cooker stand for 3 – 4 minutes.
23. Remove basket of jars from cooker and place on board or towel free from draft.

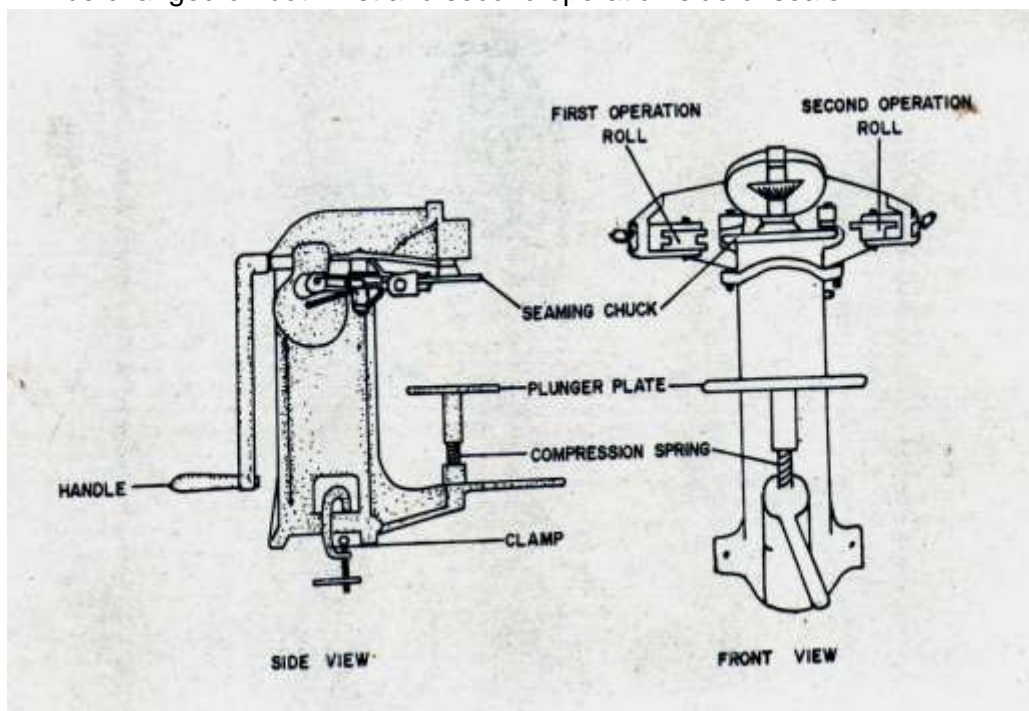
Be sure to follow the directions that come with pressure canner. Bear the alterations in mind. With regard to altitude processing, increase the pressure by 1 pound for every 508 meters or 2, 000 feet above sea level.

How to Seal Tin Cans with Hand Automatic Can Sealer

1. Fasten sealer firmly to table or armchair using clamp.
2. Attach crank to worm shaft and tighten set screw.
3. Change the chuck, height washers, and levers to the size of can to be sealed.
4. Lower base plate by turning can lifter handle as far as possible to the left.
5. Place cover on can and set can on base plate.
6. Place the first operation roll and rivet in the first adjusting lever.
7. Raise can until it is clamped firmly between base plate and chuck.
8. Turn crank clockwise (eleven turns) until the first operation roll is through half sealing. After half – sealing, the cans are placed in the pressure cooker for 15 minutes exhausting to form vacuum.
9. After exhausting the cans, remove first operation roll and put the second operation roll and rivet in the adjusting lever.
10. Turn crank clockwise (ten turns) until the second operation roll returns to its normal position away from the chuck.
11. Release sealed cans by turning can lifter handle as far as possible to the left. The machine is now ready to receive another can for sealing.

Instructions for Changing the Automatic Can Sealer from One Size to Another

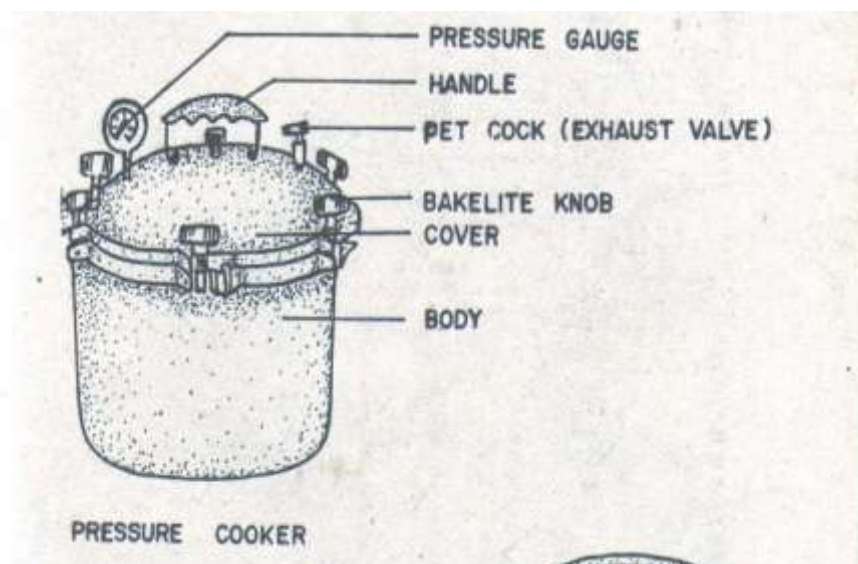
1. Pull down on chuck, which will slip out of place. While sealer is new it is sometimes necessary to force the chuck by placing a screwdriver against the chuck shaft, which is inside the chuck holder bushing.
2. Remove base plate, base plate shaft, and height washers. Put washers, marked with the size of can to be sealed on top of the compression spring.
3. Lift the rivet from the adjusting lever. Move the adjusting lever until the rivet is inserted into the hole marked with the size of can to be sealed. The rivet should be changed on both first and second operation side of sealer.



How to Use the Pressure Cooker

1. Place one – and – a – half (1/2) inch water in the cooker
2. Put rack with stand in the bottom of the cooker. A rack can be old bottles or milk cans of the same height filled with water.
3. Place the packed glass jars on the rack in the cooker.
4. Put on the cover of the cooker. Be sure the cover arrow aligns with “line mark” on rim of the body of the cooker.
5. Tighten two opposite bakelite wing nuts or knobs at the same time evenly. Never tighten one wing nut or knobs at the same time evenly. Never tighten one wing nut or knob at a time.
6. Turn on the stove. The water in the cooker begins to boil at 212° F or 100°C at sea level forming steam. The steam drives out the air through the vent pipe and heat begins to penetrate the glass jars.
7. Exhaust the air in the cooker for 8 to 10 minutes so that air cannot interfere with the passage of heat.
8. Close the vent pipe by putting the pressure regulator weight. The hole of the pressure regulator weight should correspond to the desired pressure directly over the vent pipe. For instance, if the desired pressure is 10 pounds so the pressure regulator weight hole of 10 be inserted over the vent pipe.
9. When vent pipe is closed, the steam can no longer escaped so the pressure rises up to the desired pressure. The pressure regulator weight jiggles or rocks when the pressure is reached. This is called coming up time (CUT). Water under pressure boils at temperatures above 212°F. At 10 pounds pressure gauge pressure, water boils at 240° F. Then regulate the fire.
10. If desired pressure is reached, start counting the processing time. If processing time is 90 minutes, so maintain the pressure and temperature for 90 minutes. At this stage, heat penetrates the jar by conduction or heat passes from one vibrating molecule to another. It also penetrates by convection in which heated fluids expand, rise, and are replaced by cooker fluids. In other words, heat penetrates the jar by both conduction and convection. Likewise, headspace of one half (1/2) inch of the jar acts as a cushion. In jars, the pressure usually gets so great that most of the air is driven out under the cover. The pressure and temperature in the jar is finally the same with the pressure cooker.
11. At the end of the processing time, turn off the stove. Temperature and pressure begin to fall as the cooling off period starts. Wait until the gauge registers to zero (0) pressure and remove the pressure regulator weight.
12. Loosen two opposite bakelite wing nuts or knobs at the same time. When all wing nuts were loosened, open the cover of the cooker in slanting position away from the face.
13. Get immediately the glass jars one at a time from the cooker and close. Invert the glass jars to determine if bubbles continuous to flow as sign of good sealing.
14. Cool the glass jars in room temperature as well as the cooker.

How to Care for the Pressure Cooker



1. Wash the pressure cooker if it is already cooled.
2. Store the cooker in a dry place. The cover is stored separately from the cooker body.
3. Be sure the cooker and cover are thoroughly dried to protect against pitting and corrosion.
4. Protect the metal – to – metal seal from being struck or dented.
5. Protect the metal - to – metal seal must be lubricated periodically with Vaseline oil to prevent the cover from scratching and sticking to the bottom. The metal – to – metal seal must not be permitted to become dry, as this could result on severe damage to the metal – to – metal seal and make it very difficult to remove the cover.
6. Wipe periodically the metal – to – metal seal with clean towel to remove any build – up of foreign material trapped in the lubricant.
7. Avoid hard scrubbing of the metal – to – metal seal to prevent damage.
8. The steam pressure gauge should be checked most often for its accuracy.
9. To prevent from pitting the cooker, wash, rinse and dry the cooker thoroughly every use. Do not wash the cooker while it is still hot.
10. Place lubricant on the threads of the bakelite wing nuts or knobs to help the knobs turn more easily and hold the cover securely to the cooker, preventing steam leaks.
11. Before using the cooker, hold the cover and bring against the light to see if vent pipe is clear. If you cannot see the light through the vent pipe, insert carefully a piece of wire in the vent pipe and run it gently in and out to be sure the tube is clear. Rinse the vent pipe with hot water.
12. Be sure there is always water in the cooker during canning. If cooker boils dry on the process of canning, never add cold water **only hotwater must be added**. Do not subject cooker to sudden change of temperature, as this will cause expansion or contraction, which can crack a cast aluminum utensil.
13. Pressure cooker should never be made more than 2/3 full when cooking foods like arrozcaldo with milkfish bone meal FPC. When coking foods which expand, fill cooker one – half full.

Procedure for Calibrating Equipment

Below is a sample of a manufacturer's specification on calibrating a measuring device in order that the measurement that will be obtained is accurate:

Calibrating a Loadtrac Consolidometer

1. Assemble the consolidometer with a hard steel disk of approximately the same height as the test specimen and 1 millimeter smaller diameter than the ring.
2. Moisten the porous stones and filter papers.
3. Sufficient time, a minimum of 2 minutes, shall be allowed for the moisture to be squeezed from them during each increment of the calibration process.
4. Load and unload the consolidometer as in the test and measure the deformation for each load applied.
5. Plot corrections to be applied to the deformation of the test specimen.

Equipment/Machine Wear and Tear

One factor to consider in the selection/purchase of food processing equipment is the construction materials used in making the equipment/machine, tool or utensil. Food equipment and utensils have **food contact** and **non – food contact surfaces**. **Food contact surfaces are** the parts which normally come into contact with food or from which normally come into contact with food may drain, drip, splash, or spill into or onto a surface that is normally in contact with the food. Non – food contact surfaces are the remaining parts and the surrounding area that should not make contact with the food during the production. The food contact surfaces are usually the parts that undergo wear and tear due to rubbing surfaces, which undergo friction.

The Food and Drugs Administration (FDA) and construction standards from Nation Sanitation Foundation (NSF) International and Underwriters Laboratories Inc. require food equipment and utensils to be:

1. Smooth
2. Seamless
3. Easily cleanable
4. Easy to take apart, disassemble or dismantle
5. Easy to put together or reassemble
6. Equipped with rounded corners and edges

Materials used in the construction of utensils and food – contact surfaces of equipment must be non – toxic and not impart color, odors, or tastes to foods. **Stainless steel** is a preferred material for food contact surfaces.

Under normal use, the materials should be safe, durable, corrosion – resistant, and resistant to chipping, pitting, deterioration and wear and tear of parts.

It must be noted that through constant use, equipment or machine parts suffer from wear and tear as a result of friction brought about by the rubbing surfaces or those that undergo corrosion due to a chemical reaction with substances present in the food.

To be able to address problems on wear and tear of equipment/machine parts, they must be regularly inspected and checked to determine their condition. The right selection of equipment based on the construction materials will largely help in minimizing wear and tear that affects machine efficiency.

Below are the kinds of construction materials for equipment:

1. Metals

Chromium over steel gives an easily cleanable, high - luster finish. It is used in toasters, waffle irons, etc. Noncorrosive metals formed by the alloys of iron, nickel, and chromium are also used in the construction of food service equipment.

Lead, brass, copper, cadmium, and galvanized metal must not be used as food – contact surfaces for equipment, utensils, and containers because they cause chemical poisoning if they come in contact with the food.

2. Stainless steel

Stainless steel is the most popular materials for food operations.

It is commonly used as food containers. It has a highly durable finish with a shiny surface which is easy to clean and maintain.

3. Plastic

Plastics and fiberglass are frequently used in foodservice

equipment because they are durable, inexpensive, and can be molded into different combinations.

Some examples of plastics used in food establishments are:

1. Acrylics - used to make covers for food containers
2. Melamines – used for a variety of dishes and glassware
3. Fiberglass – used in boxes, bus trays, and trays
4. Nylons – used in equipment with moving parts
5. Polyethylene – used in storage containers and bowls
6. Polypropylene – used for dishwashing racks

4. Wood

Wood is light in weight and economical but it is porous to bacteria and moisture and it absorbs food odors and stains. Wood also **wears** easily under normal use, which requires frequent maintenance and repair. Wood is used for cutting boards, cutting blocks, etc.

Two of the FDA and construction standards from NSF International and Underwriters Laboratories Inc. for food processing equipment are easy to dismantle or disassemble and easy to assemble.

To ensure that food processing equipment can be properly maintained in line with company or organization's maintenance system. The condition of machine parts can be easily detected as to the presence of:

- a. wear and tear
- b. cracks
- c. leaks
- d. corrosion

If the parts of equipment are easy to assemble and disassemble then the condition of machines or equipment can be easily reported as:

- a. serviceable
- b. repairable
- c. defective
- d. replaceable

If the parts are easy to assemble and disassemble, it is easy to dismantle machine parts that breakdown so they can be repaired or replaced right away.

Self-Check 2.3

Multiple Choice

Directions: Read and understand the questions below. Select the best answer and write the letter only on your answer in your test booklet.

1. Why is there a need of properly interpreting teacher's/mmanufacturer's specifications before operating any food processing equipment?
 - a. to be able to determine the correct operation of the equipment
 - b. to avoid accidents due to faulty operation of equipment
 - c. to be familiar with their parts and their function
 - d. all of these

2. If you will choose food processing equipment, why is it better those with parts easy to assemble and disassemble?
 - a. for easily taking the parts apart if it breakdown
 - b. to easily put back the parts after dismantling them
 - c. both a and b
 - d. because they are cheaper

3. Why should you check equipment that are electrically operated before using them?
 - a. to make sure plugs, outlets and electrical insulation are not defective
 - b. to prevent accident
 - c. to practice using the equipment
 - d. to avoid errors and accidents in their operation

4. Your teacher instructed you to use a blender in your activity of preparing mango jam. It is your first time to use such equipment. Which of these will you do?
 - a. read the manual containing the manufacturer's specification
 - b. practice using the blender
 - c. ask your classmate to demonstrate it to you
 - d. I will not do anything

5. Your can sealer is not sealing properly. Which of these will you do?
 - a. do not use it any more
 - b. request that a new sealer will be bought
 - c. undertake simple troubleshooting
 - d. borrow a can sealer from another class

6. Why should food contact surfaces of machine or equipment be regularly lubricated?
 - a. to prevent wear and tear
 - b. to prevent corrosion
 - c. both and b
 - d. none of these

7. You noticed that it is difficult to turn the knobs of a pressure cooker, which of these will you do?
 - a. change the knobs
 - b. apply lubricants like grease or oil at the screws
 - c. remove the knobs
 - d. don't do anything

8. Your teacher instructed you to check and inspect all the food processing equipment in your laboratory room. Which of these will you do later?
 - a. prepare a written report following the standard format
 - b. make a checklist of the tools and equipment inspected
 - c. make an oral report
 - d. none of these

9. Why should you operate or use equipment in accordance with manufacturers specifications?
 - a. to correctly operate them
 - b. to be familiar with their parts and functions and to correctly operate, care and troubleshoot them
 - c. to determine cost of equipment
 - d. to be familiar with the necessary safety precautions to observe

10. Which construction material for equipment porous to bacteria and absorbs moisture as well as impart odor and color to the food?
 - a. plastic
 - b. metal
 - c. stainless steel
 - d. wood



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Operation Sheet 2.1

Calibrating Refractometer

Material Tools and Equipment:

- refractometer cover
- soft tissue paper or a cotton cloth

Instructions: Follow the step by step procedures on how to calibrate a refractometer

Procedure in Calibrating Refractometer

Step 1.



Place a drop of water (preferably distilled) in the dark circular or rectangular area and close the cover.

Step 2.



A shadow or dark area is visible on the scale inside the eyepiece.

This is what the winemaker sees once he has properly calibrated the refractometer.

Step 3.



Notice that the reading is taken where the blue and the white meet. Calibrate to ZERO using distilled water as the sample.

Turn the calibration screw until the shadow falls on the zero mark

Step 4.



Open the refractometer cover and dry the cover and glass prism using soft tissue paper or a piece of cotton cloth.

Operation Sheet 2.2

Using Salinometer

Procedure:

1. Prepare brine solution.



2. Pour brine solution in a cylinder.



3. Dip salinometer in a brine solution.



4. Record the reading



5. Clean after using.

Operation Sheet 2.3

Proper Use of Blender

Equipment, tools and materials:

- blender
- outlet

Procedures:

1. Check and inspect the blender and outlets.
2. Insert the plug of blender into the outlet.
3. Switch – on the blender.
4. Operate blender in accordance with manufacturer's specifications.
5. Clean and sanitize in accordance with specifications.

Precautions:

1. Wear appropriate protective outfit when working.
2. Proper care in handling the equipment.
3. Check accuracy of the equipment.

Activity Sheet 1.1

Stowing Equipment and Instruments

Equipment, Tools and Materials Needed:

- Weighing scale and balance
- Measuring cups of varying capacities
- Measuring spoons
- Salinometer
- Thermometer
- Cylinder
- Beaker
- Flasks

Procedures in Cleaning, Sanitizing, Calibrating, and Stowing Equipment and Instruments:

1. Wash the equipment / instruments with soap.
2. Rinse with clean water.
3. Sanitize by dipping or soaking in sanitizing solution.
4. Remove from the sanitizing solution.
5. Rinse with clean water.
6. Dry thoroughly (air dry).
7. Check the accuracy of each equipment and instrument.
8. Pack and keep in a clean cabinet.

Precautions:

1. Wear appropriate clothing when working.
2. Proper care in handling the tools, devices and instruments.

3. Check the accuracy of the equipment/instruments.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Operation Sheet 2.1

Calibrating Refractometer

Did the student/s...	YES	NO	N/A
1. review the procedure in calibrating measuring instruments?			
2. check, sanitize, and calibrate the refractometer?			

Student's Name _____ Date _____

Comments/Suggestions:

**Performance Criteria Checklist for
Operation Sheet 2.2
Using Salinometer**

Did the student/s...	YES	NO	N/A
1. review procedure in using the salinometer?			
2. follow the procedure in using salinometer?			
3. record the readings accurately?			

Student's Name _____ Date _____

Comments/Suggestions:

**Performance Criteria Checklist for
Operation Sheet 2.3
Proper use of Blender**

Did the student...	YES	NO	N/A
1. prepared the equipment and checked before using?			
2. demonstrated the proper plugging into the outlet before switching?			
3. cleaned and sanitized the equipment before and after using in accordance with specifications of teacher's instructions?			

Student's Name _____ Date _____

Comments/Suggestions:

Performance Criteria Checklist for

Activity Sheet 1.1

Stowing Equipment and Instruments

Did the student/s...	YES	NO	N/A
1. identify and classify standard measuring devices and instruments?			
2. apply the proper ratio in preparing the sanitizing solution?			
3. check the accuracy of the equipment/instruments?			
4. pack/store/arrange the stowed instruments in a clean dry cabinet?			

Student's Name _____ Date _____

Comments/Suggestions:

LEARNING OUTCOME 3

Perform post-operation activities

PERFORMANCE STANDARDS

1. Switching off/unplugging procedures of food (fish) processing equipment is described in accordance with manufacturer's specifications.
2. Food processing tools are cleaned, sanitized and stored as required according to manufacturer's specifications and workplace policies and regulations.
3. Procedures in cleaning, sanitizing and storing food processing equipment and instruments are described according to manufacturer's specifications and workplace policies and regulations.
4. Minor preventive maintenance procedures on equipment and instruments are discussed in line with organization's maintenance system.
5. Defective tools, equipment and instruments are disposed according to environmental procedures.



Materials

- can sealer
- pressure cooker
- gas stove
- table



What Do You Already Know?

Let us determine how much you already know about the use farm tools and equipment. Take this test.

Pretest LO 3

Multiple Choice:

Directions: Read and understand the questions below. Select the best answer from the options given. Write the letter only of your answer in your test booklet.

1. Why do you need to inspect and check equipment/machines before, during and after using them?
 - a. to make sure they are in good condition
 - b. to determine defective machine parts
 - c. to determine trouble shooting activities to perform
 - d. all of these
2. There is a strong odor of a gas coming from the LPG tank of the gas range in your Food Processing Laboratory Room, which of these will you conclude?
 - a. the LPG tank has a leak
 - b. The hose connected to the LPG might be leaking
 - c. The LPG regulator is defective
 - d. All of these
3. In order to prevent electrocution or fire due to short circuits, which of these should you do before using any equipment/machine?
 - a. check electrical outlets
 - b. check plugs and switch of electrical equipment/machines
 - c. check electrical cords
 - d. all of these
4. Which of these is a manufacturer's specification concerning the use of a freezer in the food processing plant?
 - a. Switch off before unplugging
 - b. Just unplug even if not switched off
 - c. Do not defrost regularly
 - d. None of these
5. To prevent the metal surface of your gas range, oven and gas stove to corrode, which of these should you do?
 - a. wash with soap and water
 - b. wipe off spilled food then wash and wipe thoroughly
 - c. scrape the surfaces with spilled food then apply lubricants
 - d. none of these



What Do You Need To Know?

Read the Information Sheet 3.1 very well then find out how much you can remember and how much you learned by doing Self-check 3.1.

Information Sheet 3.1

Perform Post-Operating Procedure

Equipment are essential machines in a food processing plant that are important in undertaking activities in line with processing foods like fish, meat, fruits and vegetables through salting, smoking, drying, pickling, freezing or canning. In every method of processing or preserving the food, different kinds of equipment are used. To ensure that there is a smooth operation of any equipment, they must be properly maintained. Proper maintenance starts with regular checking and inspection of their parts, proper use or operation/manipulation, and conducting post operation activities such as cleaning/sanitizing, applying oil and lubricants to machine parts before stowing or storing them until such time that they will again be used. Equipment/machines which undergo regular preventive maintenance have a longer serviceability and are more efficient in terms of their operation.

Inspecting and Checking Condition of Equipment/Machines Before, During and After Operation

All equipment/machines to be used in processing /preserving foods like fish, meat, fruits and vegetables must be inspected and checked to determine their condition prior to use and even after using them. Before they are to be stowed or kept after use, they must be inspected and checked to make sure they are in good condition and ready for use in the next processing operation. Religiously inspecting and checking the equipment/machines after use will help determine the presence of damaged or defective parts that need to be repaired or replaced. Inspecting and checking the equipment /machines will also help determine the presence of equipment/machines that breakdown and cannot be used in the next processing operation. Defective plugs, switch and other parts of equipment/machines that are electrically operated will also be determined and thus avoid accidents like electrocution and other hazards arising from short circuit, etc.

Inspecting and checking the equipment before, during and after using them will also help in effectively planning and efficiently carrying – out trouble shooting and preventive maintenance activities which include checking the following:

1. Machine temperature – this is checked to avoid overheating
2. Hydraulic fluid – this must be checked to guarantee that the equipment/machine which is operated by water or other liquids moving through pipes under pressure will function well

3. Wear and surface condition – this is being checked to make sure no machine parts are deteriorating or defective due to everyday use
4. Crack – this needs to be checked to see to it that there are no broken parts in an equipment or machine which will cause the breakdown of the machine or as a source of leak
5. Leak detection – this is checked to prevent accidental release of gas, water, oil, etc. from the machine
6. Vibration -
7. Corrosion – this is checked to minimize wear and tear of parts by washing, drying and lubricating machine parts.
8. Electric insulation – this must be checked to guarantee that there are no livewires exposed during the operation of an equipment which may result to short circuits or electrocution and even fire.

Proper Maintenance Of Some Food Processing Equipment

Below are some equipment used in processing foods that need to be regularly inspected and checked before, during and after operation:

1. The Can Sealer



2. The Pressure Cooker



3. The Mechanical and Electric Smokehouses



4. The Freezer and Refrigerator



5. The Electric Fish Scalers



6. The Oven and Gas Stove



Gas stove

7. The Food Processor/Blender and Juice Extractor



8. The Vacuum Packer



9. The Electric Polysealer



Performing Minor Troubleshooting

Troubleshooting on equipment/machines that breakdown is very essential in a food processing plant. This is a way by which faulty/malfunctioning or defective machine parts are diagnosed and their appropriate repair or replacement is effectively done. Performing minor troubleshooting of equipment/machines that breakdown ensures a longer capability of the equipment/machine to be operated or used. Minor troubleshooting must be done in accordance with manufacturer's specification by a repairman who is an expert on the troubleshooting of equipment/machines that breakdown. Below are some minor troubleshooting activities that are undertaken:

1. Replacement of the defective parts of equipment like can sealer, pressure cooker, gas stove and gas range, etc.
2. Replacement of the missing parts of a can sealer, pressure cooker, gas range, gas stove, etc.
3. Replacement of defective or malfunctioning electrical cords, plugs and switch of electrically operated equipment like freezer, refrigerator, smokehouse, fish scalers, blenders, poly sealers, etc.
4. Applying lubricant to machine parts that are slightly undergoing corrosion or wear and tear.
5. Replacement of machine parts with cracks or leaks.
6. Replacement of leaking pipes in equipment requiring hydraulic fluid.

Performing Minor Preventive Maintenance

Preventive Maintenance is a system of maintenance that aims to minimize or eliminate breakdown in equipment and machinery by a program of regular inspection and repairs. This is done make sure that all equipment machines in the food processing plant are always in good condition and ready for use anytime. Regularly inspecting the condition of equipment/machines and promptly repairing those ones that breakdown will guarantee that the processing of food will be smoothly undertaken as required by the company thus, eliminating or minimizing the occurrence of accidents or faulty operation of equipment/machines. It is important to remember, however, that the preventive maintenance activities to be undertaken must be in conformity with manufacturer's specification and in line with company's policy.

The following are some minor preventive maintenance done with equipment/machines:

1. Checking the switch, plugs and electrical cords of electrically operated equipment.
2. Checking the parts of some equipment/machines to determine if there are defects, wear and tear, cracks, leaks, rusts or corrosion.
3. Checking the equipment/machine thoroughly to make sure that all parts are intact. Missing parts will cause the equipment/machine to malfunction.
4. Cleaning, sanitizing and stowing all equipment/machines according to manufacturer's specifications and workplace policies and regulations.
5. Regularly checking and inspecting main machine parts to guarantee that the machine is in top shape or condition.
6. Checking the condition of the machine and classify them as:
 - a. Serviceable
 - b. Repairable
 - c. Defective
7. Applying lubricants like oil and grease that undergo corrosion and friction to prevent or minimize wear and tear of rubbing surfaces.
8. Checking machine temperature, hydraulic fluid, vibration, etc.
9. Performing proper cleaning, care and sanitation.

Below are examples of how some equipment/ machines are properly maintained or cared for:

The Pressure Cooker

1. Thoroughly wash with soap and hot clean water then drain completely before and after use.
2. Lubricate the metal – to – metal seal with cooking oil, petroleum jelly, Vaseline, etc. to prevent the cover from scratching or sticking. Check this seal from time – to – time during the canning process to be sure sufficient lubrication is present. Apply a thin film of lubricant to the edge inside the cooker where the inside wall begins to bevel.
3. Apply lubricant on the threads of the bakelite wing nuts; wipe away excess lubricant.
4. Always keep safety openings clear to make sure steam can pass through them.
5. Before and after using the cooker, clean the vent pipe by carefully inserting a thin piece of wire in the vent and run it gently in and out to be sure it is clear and unobstructed. Rinse with hot water.
6. Do not subject the cooker to sudden extreme temperature changes as this will cause expansion or contraction which can crack the cast aluminum pressure cooker. Do not add cold water to a cooker that boiled dry or cool a hot cooker suddenly by pouring cold water or wrapping it with wet cloth.
7. If you ever drop the cooker, it must be examined for damage.
8. Periodically wipe – off the metal – to – metal seal with a clean towel to remove any build – up of hardened lubricant. Avoid hard scrubbing of the metal – to – metal seal to prevent damage.
9. Prevent discoloration by scrubbing with an aluminum cleaner or soap impregnated steel wool cleaning pad. Pitting of the cooker is prevented by washing, rinsing, and drying the unit thoroughly every after use.
10. Always store the cooker in a dry area when not in use. The cover should be stored separately from the cooker or upside down on the cooker to allow air circulation. Always be sure cover and cooker are thoroughly dry to protect against pitting and corrosion.
11. Protect the metal – to metal seal from being struck and dented.

The Can Sealer

The parts of an automatic manual can sealer are easier to dismantle and assemble as compared with the automatic electrically operated sealing machine. However, when dismantling or assembling the parts of the can sealer, careful handling is required to make sure all parts are properly in place and not a single part is misplaced or lost. Before assembling the parts, these must be done:

1. Check that all parts are present.
2. Lubricate parts that rub each other to prevent friction that leads to wear and tear of surfaces.
3. Lubricate the crankshaft, the seaming head, bevel gears, clamp, etc. Wipe away excess lubricant.
4. Wash the chuck and the base plate after sealing tin cans with soap and clean water to remove oil, sauce and brine that spilled on them. Rinse thoroughly. Wipe dry with a clean towel.
5. Store in a clean dry place.
6. Replace all damaged, missing or defective parts.

The Freezer

1. Use the freezer in accordance with purpose described in the user's manual.
2. Properly install the freezer in accordance with installation requirements.
3. Switch control to OFF before unplugging.
4. Unplug the freezer before cleaning, before repairing any parts by a qualified repairman.
5. Always grip plug firmly and pull straight out from the outlet, when unplugging.
6. When moving the freezer away from the wall, be careful not to roll over or damage the power cord.
7. Immediately repair or replace all electric service cords that have become frayed or otherwise damaged. Do not use a cord that shows cracks or abrasion damage along its length or either the plug or connector end.
8. After the freezer is in operation, do not touch the cold surfaces, particularly when hands are damp or wet. Skin may adhere to these extremely cold surfaces.
9. Operate freezer away from explosive fumes.
10. Refrain from using electrical devices or sharp instruments in defrosting your freezer.
11. The freezer must be properly grounded when installed.
12. Defrost regularly.
13. Clean the interior to prevent food from being contaminated during storage. Remove detachable parts and wash in warm water and baking soda solution (Use 1 tablespoon of baking soda per liter of water). Follow the same procedure for cleaning the door gasket, wire basket, and all plastic parts.
14. Clean exterior surfaces with warm water and dish washing detergent. Dry and polish with a soft cloth. Do not wipe with soiled dish washing cloth or wet towel. This may leave residue that may corrode the paint. Do not use scouring pads, bleach or cleaners because they scratch and weaken the paint finish.
15. In case of brownouts, turn the temperature control to OFF and unplug your freezer to avoid OVERLOADING your compressor when power is restored.

The Refrigerator

The refrigerator which has an automatic defroster should be thoroughly cleaned every week by wiping off containers of food and removing all foods that cannot be used. Refrigerators which do not have automatic defrosters should be

defrosted whenever the frost on the frosting unit is over ¼ inch thick. When caring for your refrigerator follow the procedure below:

1. Wipe up spilled food immediately.
2. Wash inside shelves and trays at least twice a week with 1 table spoon baking soda dissolved in 1 liter clean water.
3. Rinse and dry thoroughly.
4. Flush drains/defrost weekly.

When defrosting the refrigerator follow these steps:

1. Turn off the electric current.
2. Remove all ice trays and frozen foods from the freezing unit.
3. Wrap frozen foods in newspaper to keep them from thawing.
4. Put the drip tray in the proper place to catch the melted ice.
5. Place pans of hot water in the lower part of the freezing unit. Allow the ice to melt. Never use a sharp or pointed object to remove the ice.
6. Remove the food in the lower part of the refrigerator.
7. Wipe the inside portion of the freezing unit as well as the refrigerator with water to which 1 teaspoon baking soda has been added for each quart.
8. Turn on the current and return the food to the refrigerator.

Proper use the refrigerator by following these steps:

1. Study the booklet which is supplied by the manufacturer.
2. Keep the temperature between 35°F and 45°F.
3. Allow the food to cool before putting it in the refrigerator.
4. Open the door only when absolutely necessary and keep it open as short a time as possible.
5. Put leftovers in small dishes and use them as soon as possible to avoid overcrowding the refrigerator.
6. Remove food from paper bags before storing in the refrigerator.
7. Do not store unopened cans of food in the refrigerator unless they are to be chilled for the next meal.
8. Store foods in covered dishes or glass jars to prevent odors from spreading.
9. Avoid getting grease on the gasket around the door.
10. Decide on a definite place in which to keep each kind of food, and put the foods in the same places each time so that you will not waste time in looking for them.

The Gas Range and Gas Stove

In caring for your cooking equipment, follow the steps below:

1. Remove all burnt sediment and wipe grease from top of stove after each use
2. Scrape grease from cracks, openings, and hinges.
3. When cool, wash top of stove.
4. Keep burners clean. Gas burners can be soaked and scrubbed with a stiff brush.
5. Wipe with a clean cloth dipped in a sanitizing solution.

Use and Care of the Gas Range and Gas Stove

When using the range, remember to:

1. **Use** utensils that are large enough to prevent the boiling food from spilling over the range top or oven;
2. **Keep** a dish on the range top for the spoon that you use in stirring food;
3. **Avoid** putting anything hot on porcelain enameled surfaces or putting cooking utensils across them the heat may cause the surface to chip or crack;
4. **Arrange** pans in the oven so that the air can circulate around them; and
5. **Wipe** the chromium trimming with a damp cloth and polish it with a dry cloth.

Cleaning the Top of a Gas Range and a Gas Stove

1. Remove the burners and the rack and scrub them with warm, soapy water and scouring pad.
2. Clean the holes with a hair pin or wire. Do not use a toothpick.
3. Rinse with clear, hot water, and dry the rack; turn the burners of the oven upside down.
4. Return the burners and the rack to the range as soon as they are dry.

Note: Be sure the hose or pipe where the gas will pass don't have leaks.

Cleaning the Units of an Electric Cooking Range

1. Turn on the high heat so that any food on the units will burn off.
2. Cool, and then brush each unit with a soft non-metallic brush. Never clean the unit with a metal brush, a fork, a knife, or a sharp metal tool.
3. Use steel wool or a cloth for units which are enclosed.

The Oven

Follow these steps when cleaning your oven:

1. Use a pancake turner to remove food immediately after it has spilled on on the oven.
2. Clean the oven thoroughly with a special cleaner when it is cool.
3. Wipe the oven with soapy water. Rinse with clean water and dry.
4. Turn on the oven for a few minutes to dry all parts so that they will not rust.
5. Be sure the gas tank and hose do not have any leaks.

Reporting the Breakdown of Equipment/Machine, Tools and Utensils

The person in charge of inspecting and checking equipment/machines used in processing foods like fish, meat, fruits and vegetables must make the necessary report regarding the breakdown of equipment/machine, tools and utensils and furnish the report to the person responsible in scheduling the trouble shooting and repair of any equipment/machine, tools and utensils that breakdown. In preparing such report, it is necessary to follow the prescribed format required by the company or organization. This is done to rigidly monitor the condition of all equipment/machines to ensure their serviceability in accordance with workplace rules and regulations. Through the prepared reports, a conclusion as to the condition of equipment/machines can be accurately made as to: **a) serviceable, b)repairable and c) defective**. The compiled reports will provide a ready database as to the needs of the company in terms of:

1. machine parts to be purchased
2. expenditures incurred for repair and purchase of machine parts
3. labor requirement for preventive maintenance and trouble shooting

A Sample Report on Equipment/Machine Breakdown

Daily Inspection Report	Date:			Remarks and
Condition	Before Operation	During Operation	After Operation	Recommendations
Can Sealer				
Pressure Cooker				
Mechanical/Electric Smokehouse				
Freezer				
Refrigerator				
Electric Scaler				
Oven				
GasRange				
Gas Stove				
Food Processor/Blender				
Juice Extractor				
Vacuum Packer				
Electric Polysealer				

Inspected by: _____

Reviewed by: _____

The use of appropriate equipment in top condition is of primary importance in the production of good food. Standardized equipment, a variety of knives, the right kitchen tools, utensils, and appliances all contribute to the production of processed food with an excellent quality.

It is therefore important to religiously conduct post operation activities to make sure that equipment/machineries are properly inspected, checked, cleaned and sanitized and subjected to preventive maintenance in accordance with manufacturer's specification and company policies.

The Preventive Maintenance to be performed includes checking the following:

1. Machine temperature
2. Hydraulic fluid
3. Wear and surface condition
4. Crack
5. Leak detection
6. Vibration
7. Corrosion
8. Electric insulation



How Much Have You Learned?

Self-Check 3.1

Fill in the blanks

1. _____ to test the accuracy; to examine something in order to establish its state or condition.
2. _____ is mechanical failure causing a machine or equipment to malfunction.
3. _____ a break or fissure on some parts of an equipment as in the body of a pressure cooker.
4. _____ death or execution from electric shock.
5. _____ to carefully examine a machine or equipment in order to determine maintenance to undertake..
6. _____ a substance like oil or grease that coats or treats a machine to lessen friction and the wear and tear of machine parts due to constant rubbing of surfaces.
7. _____ a system of maintenance that aims to minimize or eliminate breakdown in equipment and machinery by a program of regular inspection and repairs.
8. _____ to restore a machine or equipment that breaks down into good order or condition.
9. _____ electrical device having two (2) states, ON (closed) OFF (open).
10. _____ to turn off an electrical device.



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Operation Sheet 3.1

Perform Preventive Maintenance of Can Sealer and Pressure Cooker

Equipment, tools and materials needed:

- can sealer
- pressure cooker
- gas stove
- table

Procedures:

The Pressure Cooker

1. Thoroughly wash with soap and hot clean water then drain completely before and after use.
2. Lubricate the metal – to – metal seal with cooking oil, petroleum jelly, Vaseline, etc. to prevent the cover from scratching or sticking. Check this seal from time – to – time during the canning process to be sure sufficient lubrication is present. Apply a thin film of lubricant to the edge inside the cooker where the inside wall begins to bevel.
3. Apply lubricant on the threads of the bakelite wing nuts; wipe away excess lubricant.
4. Always keep safety openings clear to make sure steam can pass through them.
5. Before and after using the cooker, clean the vent pipe by carefully inserting a thin piece of wire in the vent and run it gently in and out to be sure it is clear and unobstructed. Rinse with hot water.
6. Do not subject the cooker to sudden extreme temperature changes as this will cause expansion or contraction which can crack the cast aluminum pressure cooker. Do not add cold water to a cooker that boiled dry or cool a hot cooker suddenly by pouring cold water or wrapping it with wet cloth.
7. If you ever drop the cooker, it must be examined for damage.
8. Periodically wipe – off the metal – to – metal seal with a clean towel to remove any build – up of hardened lubricant. Avoid hard scrubbing of the metal – to – metal seal to prevent damage.
9. Prevent discoloration by scrubbing with an aluminum cleaner or soap impregnated steel wool cleaning pad. Pitting of the cooker is prevented by washing, rinsing, and drying the unit thoroughly every after use.

10. Always store the cooker in a dry area when not in use. The cover should be stored separately from the cooker or upside down on the cooker to allow air circulation. Always be sure cover and cooker are thoroughly dry to protect against pitting and corrosion.
11. Protect the metal – to metal seal from being struck and dented.

The Can Sealer

The parts of an automatic manual can sealer are easier to dismantle and assemble as compared with the automatic electrically operated sealing machine. However, when dismantling or assembling the parts of the can sealer, careful handling is required to make sure all parts are properly in place and not a single part is misplaced or lost. Before assembling the parts, these must be done:

- a. Check that all parts are present.
- b. Lubricate parts that rub each other to prevent friction that leads to wear and tear of surfaces.
- c. Lubricate the crankshaft, the seaming head, bevel gears, clamp, etc. Wipe away excess lubricant.
- d. Wash the chuck and the base plate after sealing tin cans with soap and clean water to remove oil, sauce and brine that spilled on them. Rinse thoroughly. Wipe dry with a clean towel.
- e. Store in a clean dry place.
- f. Replace all damaged, missing or defective parts.

Precautions:

1. Wear appropriate protective outfit when working.
2. Proper care in handling the equipment.
3. Check accuracy of the equipment.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria 3.1 Checklist for Operation Sheet

Perform Preventive Maintenance of Can Sealer and Pressure Cooker

Did the student...	YES	NO	N/A
1. performed the task on maintaining the equipment (can sealer and pressure cooker)?			
2. conducted the important preventive maintenance of the equipment?			
3. possessed the knowledge and skills in performing post-operation activities after using the equipment?			

Student's Name _____ Date _____

Comments/Suggestions:



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

REFERENCES

LO1

- CBLM – Fish Processing II, page 11
- http://www.grapestompers.com/articles/refractometer_use.asp

LO 2

- CBLM – Fish Processing II, page 11
- http://www.grapestompers.com/articles/refractometer_use.asp

LESSON 2

Perform Mathematical Computations



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO1. Gather and tabulate the recorded data relevant to processed production.
- LO2. Review various formulations.
- LO3. Calculate the production input and output.
- LO4. Compute the costs of production.



Definition of Terms

Concentration of a solution	the amount of solute present in a given quantity of solvent.
Conversion	a change from one state or position to another or from one form to another.
Cost	the total amount spent for goods or services including money, time, and labor
Data	a collection of information about a study under investigation. It may be a number (quantitative) or a word (qualitative).
Documentation	a systematic procedure of producing a record for reference.
Input	something that enters a process from the outside and is acted upon or integrated in the main body of data.
Measurement	a way of comparing certain attribute of an object with some given standard.
Output	anything produced especially through a process, a product, or a yield.
Production cost	the combined cost of raw materials and labor incurred in producing goods.
Production Report	a written record showing the input – output relationship in determining the yield from a certain procedure.
Raw food cost	the amount spent for buying raw ingredients.
Recording	the process of capturing data or translating information to a recording format stored on some storage medium, which is often referred to as a record
Semi-permeable membrane	a material that allows molecules of one kind to pass through it but prevents the passage of other kinds of molecules.
Solution	a homogenous mixture of substances with variable composition.
Tabulate	to count, record, or list systematically.

LEARNING OUTCOME 1

Gather and tabulate the recorded data relevant to processed food production.

PERFORMANCE STANDARDS

1. Records of weights and measurements of raw materials and ingredients are gathered and summarized according to workplace standard operating procedure.
2. Records of weights and measurements of finished processed products are gathered and summarized according to workplace standard operating procedures.
3. Summarized data are tabulated according to enterprise requirements.



What Do You Already Know?

Let us determine how much you already know about the gathering and tabulating the recorded data relevant to processed food production . Take this test.

Pretest LO 1

Multiple Choice:

Directions: Carefully read the questions and choose your answer from the options given. Write your answers in your answer sheet.

1. How many teaspoons are there in one tablespoon?
A. 2
B. 3
C. 4
D. 5
2. How many tablespoons are there in one cup?
A. 13
B. 14
C. 15
D. 16
3. Which of the following is equivalent to one kilogram?
a. 1500 g
b. 1000 g
c. 2000 g
d. 2500 g
4. What is the equivalent of 32⁰F to Centigrade?
A. 0⁰C
B. 2⁰C
C. 1⁰C
D. 3⁰C
5. What do you call a form with only a few data presented?
A. tabular form
B. textual form
C. graphical form
D. none of the above



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

LO1. Gathering the Record of Weights and Measurement of Ingredients and Materials

Not a day passes without any of us taking certain measurements. You measure the time it takes you to solve problem in STVEP. The meat dealer measures the amount of pork your mother buys with P 100.00. Your sister measures the flour she needs for her cake recipe. Even infants get a share of measurement through the amount of milk formula given them everyday, not to mention the fact that their growth is measured by their gains in weight and height.

What do you really do when you take measurements? For instance, when you take your weight, you use a weighing scale. You keep a record of your weight, trying to find out how much you have gained or lose.

Mass is the amount of material an object has. The base unit of mass is gram (g). For heavier mass, the unit used is the kilogram(kg).

Volume is the amount of space something occupies. The unit used for measuring the volume of liquid is the litre. (L).

Capacity refers to how much a container can hold.

Temperature refers to the degree of hotness or coldness of a body. The metric unit of temperature is degree Celsius ($^{\circ}\text{C}$). In the Celsius Scale, 0°C is the freezing point of water, and 100°C is the boiling point of water. The instrument used for measuring temperature is the thermometer. Another unit of temperature is degree Fahrenheit (0°F).



Measurements and Conversions

It is important to weigh or measure all ingredients accurately, especially for beginners. There are cooks and chefs who seem to be able to produce good results by guesswork and intuition because of their long experience in cooking. However, that should not be the case. What generally matters is using precise measurement.

When weighing things, it is essential to buy a good brand of weighing scale that would longer. A good selection of measuring cups and spoons (as listed below) can be very handy.

a. Measuring Cups

- 1 Cup (C)
- 1/2 C
- 1/3 C
- 1/4 C
- 1/8 C

b. Measuring Spoons

- 1 Tablespoon (tbsp or T)
- 1 Teaspoon (tsp or t)
- 1/2 tsp
- 1/4 tsp

A clear glass measuring cup is necessary to get precise liquid measurements.

Dry Ingredients - The most important thing to know about measuring dry ingredients is that they should be level with the top of your measuring cup. Dip your cup into the bin, fill to overflowing and level it off by sweeping the edge of a knife across the top. Spoon flour and similar ingredients into measuring cups. Do not scoop the ingredient using the cup itself because this “packs” the cup too much and the measurement won’t be precise. Be careful if you are using a cup larger than what is needed (as in a 1 cup measure to get 1/2 C worth of ingredients). The same leveling technique should be used with measuring spoons.

Tips : Measure dry ingredients over a plate or bowl so you can catch the excess and put it back in the container.

Most ingredients don't need to be packed into the measuring cup. Granulated sugar does it for you. Flour should actually be aerated or fluffed up before measuring. **Brown sugar is one exception**, if you want to pack down while measuring in order to get the proper amount.

Measure liquids at eye level. In other words, place the cup on a flat surface and crouch down so your eyes are at the same level as the cup in order to check the accuracy of the amount in the cup.

To measure solid fats (shortening, butter etc.) : Most butter has measurements listed on the wrapper, so you can simply cut off the amount you need. If that information is not available, to measure fats accurately, pack them down in the cup to get rid of air pockets. It’s easier to pack fats at room temperature. Another method that works well for butter and

especially shortening is water displacement (this works for any fraction of a cup measurement). For instance, if you need 1/2 C shortening fill a 1 cup measure 1/2 full with water. Carefully add shortening to the cup until the water reaches the top of the cup. Drain the water and use the shortening.

Abbreviation	Long
c	cup
gal	gallon
gm	gram
kg	kilogram
lb	pound
ml	milliliter
oz	ounce
pt	pint
qt	quart
tbsp	tablespoon
tsp	teaspoon
fl. oz.	fluid ounce

Weight Measurements and Conversions

Weight Conversion Factors		
Multiply	By	To Get
Grams (gm)	0.035	Ounces
Grams	0.0022	Pounds
Grams	0.001	Kilograms
Kilograms (kg)	2.21	Pounds

Kilograms	1000	Grams
Pounds (lb)	453.6	Grams
Pounds	0.4536	Kilograms
Pounds	16	Ounces
Ounces (oz)	0.0625	Pounds
Ounces	28.3	grams

Approximate Metric Equivalent by Weight (US-Metric)	
U.S.	Metric
¼ ounce (oz)	7 grams (g)
½ ounce	14 grams
1 ounce	28 grams
1 ¼ ounces	35 grams
1 ½ ounces	40 grams
2 ½ ounces	70 grams
4 ounces	112 grams
5 ounces	140 grams
8 ounces	228 grams
10 ounces	280 grams
15 ounces	425 grams
16 ounces (1 pound)	454 grams

Liquid Measurements and Conversions

	tsp.	Tbsp.	fl.oz	gill	cup	pint	Quart	gallon
1 teaspoon =	1	1/3	1/6	1/24				

1 tablespoon =	3	1	1/2	1/8	1/16			
1 fluid ounce =	6	2	1	1/4	1/8	1/16		
1 gill =	24	8	4	1	1/2	1/4	1/8	
1 cup =	48	16	8	2	1	1/2	1/4	1/16
1 pint =	96	32	16	4	2	1	1/2	1/8
1 quart =	192	64	32	8	4	2	1	1/4
1 gallon =	768	256	128	32	16	8	4	1

US Customary System	Spoons	fluid oz.	Approx. milliliters
1/16 cup (c) =	1 tablespoon (tbsp) = 3 teaspoons (tsp)	1/2 fl.oz	15 ml
1/8 cup =	2 tablespoons	1 fl.oz.	30 ml
1/6 cup =	2 tablespoons + 2 teaspoons	1.3 fl.oz	40 ml
1/4 cup =	4 tablespoons	2 fl.oz.	60 ml
1/3 cup =	5 tablespoons + 1 teaspoon	2.7 fl.oz	80 ml
3/8 cup =	6 tablespoons	3 fl.oz.	90 ml
1/2 cup =	8 tablespoons	4 fl.oz.	120 ml
2/3 cup =	10 tablespoons + 2 teaspoons	5.3 fl.oz.	155 ml
3/4 cup =	12 tablespoons	6 fl.oz.	180 ml
1 cup =	16 Tablespoons	8 fl.oz.	235 ml
1 3/4 cup =		14 fl.oz.	410 ml

2 cups = 1 pint =		16 fl.oz.	470 ml
3 cups =		24 fl.oz.	700 ml
4 cups = 1 quart =		32 fl.oz.	940 ml

MISCELLANEOUS	EQUIVALENT
1 pinch	1/8 teaspoon or less
1 teaspoon	60 drops
1 dessertspoon (UK)	2 teaspoons

Approximate liquid measurement conversion factors		
Multiply	By	To Get
Quarts (qt)	0.95	liters
Quarts	4	cups
Liters (l)	1.06	quarts
Liters	1000	milliliters
Cups	235	milliliters
Cups	8	fluid ounce
Cups	0.25	quarts
Milliliters (ml)	0.0042	cups
Milliliters	0.067	tablespoons

Mililiters	0.034	fluid ounce
Fluid ounce (fl. oz)	29.6	milliliters
Fluid ounce	0.125	cups
Gallons (gal)	3.785	liters

Temperature Measurements and Conversions



To convert **Degrees Celsius (Centigrade) °C to Degrees Fahrenheit (°F)**, multiply °C by 1.8 and add 32.

For example, to convert 100°C to °F,
 $100 \times 1.8 + 32 = 212^{\circ}\text{F}$

To convert **Degrees Fahrenheit (°F) to Degrees Celsius (°C)**, subtract 32 from °F first, then multiply by 0.56.

For example, to convert 200°F to °C,
 $(200 - 32) \times 0.56 = 94^{\circ}\text{C}$

Freezing point for water = 0°C = 32°F
 Boiling point for water = 100°C = 212°F

Temperature Conversion Table

Fahrenheit	Celcius	Celcius	Fahrenheit
32 °F	0°C	0 °C	32 °F
40 °F	4.4 °C	10 °C	50 °F
50 °F	10 °C	20 °C	68 °F
60 °F	15.6 °C	30 °C	86 °F
70 °F	21.1 °C	40 °C	104 °F
80 °F	26.7 °C	50 °C	122 °F

90 °F	32.2 °C	60 °C	140 °F
100 °F	37.8 °C	70 °C	158 °F
110 °F	43.3 °C	80 °C	176 °F
120 °F	48.9 °C	90 °C	194 °F
130 °F	54.4 °C	100 °C	212 °F
140 °F	60 °C	110 °C	230 °F
150 °F	65.6 °C	120 °C	248 °F
160 °F	71.1 °C	130 °C	266 °F
170 °F	76.7 °C	140 °C	284 °F
180 °F	82.2 °C	150 °C	302 °F
190 °F	87.8 °C	160 °C	320 °F
200 °F	93.3 °C	170 °C	338 °F
225 °F	110 °C	180 °C	356 °F
250 °F	120 °C	190 °C	374 °F
275 °F	135 °C	200 °C	392 °F
300 °F	150 °C	210 °C	410 °F
325 °F	165 °C	220 °C	428 °F
350 °F	175 °C	230 °C	446 °F
375 °F	190 °C	240 °C	464 °F
400 °F	205 °C	250 °C	482 °F
425 °F	220 °C	260 °C	500 °F
450 °F	230 °C	270 °C	518 °F
475 °F	245 °C	280 °C	536 °F

500 °F	260 °C	290 °C	554 °F
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Summarizing and Tabulating All Raw Data Gathered

Any set of information or data collected for study should be organized and analyzed systematically for easier and faster interpretation. To do this, collected data may be presented in any of the following forms:

1. The textual forms are used when data to be presented are few.
2. The tabular and graphical forms are used when more detailed information is to be presented.

Using tables and graphs has the following advantages:

1. Data are presented in a more practical and convenient way. Instead of writing text on the information gathered, items can be enumerated in tabular form or shown in graphical form.
2. Data can be compared more easily. Recording tables and graphs can be done more easily because the needed information can be seen at a glance.
3. Data can be analyzed comparatively. Tables and graphs enable a thorough analysis of data because all needed information is clearly known.

Example: (Textual Form)

Marinated Boneless Milkfish

Raw Materials:

Fresh milkfish	- 1 kilogram
Vinegar	- 1 cup
Calamansi juice	- ½ cup
Soy sauce	- ½ cup
Salt	- 5 tablespoons
Sugar	- 5 tablespoons
Black pepper	- 1 tablespoon
Garlic (minced)	- 1 tablespoon

Steps:

- a. Weigh the fish.

- b. Split them and remove the viscera, backbone and dorsal fin.
- c. Wash the fish with freshwater.
- d. Wash again the deboned milkfish and drain for 15 minutes.
- e. Soak the deboned milkfish for 7 hours in marinated solutions composed of vinegar, salt, sugar, soy sauce and spices.
- f. Pack the boneless milkfish in plastic bags and seal.
- g. Freeze them to be ready for market.

Recording Skills

In recording we need the following skills:

Accuracy

The measurement of any physical quantity is always subject to some degree of uncertainty. There are several reasons for this: the limitation inherent in the construction of the measuring instrument or device, the conditions under which the measurement is made, and the different ways in which the person uses or reads the instrument.

One way to express the uncertainty of a measurement is in terms of accuracy. Accuracy refers to the closeness of a measurement to the accepted value for a specific physical quantity. It is expressed as either an absolute or a relative error. Absolute error is the actual difference between the measured value and the accepted value.

Relative error is expressed as a percentage and is often called percentage error. It is calculated as:

$$E_r = \frac{E_a}{A}$$

$$\times 100\%$$

E_r - relative error

E_a - absolute error

A - accepted value

Precision

In common usage accuracy and precision are often used synonymously. But in science it is important to make a distinction between them. You should learn to use the two terms correctly and consistently. Precision is the agreement among several measurements that have been made in the same way.

The precision of your laboratory measurements will be governed by the instruments at your disposal. In a measuring instrument the degree of precision obtainable is called the tolerance of the device. Any figure listed for the tolerance of an instrument indicates the limitations of the instrument. It is assumed that the instrument is used properly and that human errors are held to a minimum.

Data Gathering Skills

When you want to know whether several boxes of preserving bottles are free from defects, it would be time consuming to examine all of them piece by piece. How can you facilitate the quality test?

You can do this by examining a few samples from each box. This process is called sampling and the defined set of that sample is called population.

When for example, a housewife buys a cavan of rice, she examines only a handful of rice from the cavan to find out whether it is of good quality or not.

- ▣ The handful of rice is called the sample.
- ▣ The cavan of rice from which the sample is taken is called population.



How Much Have You Learned?

Self-Check 1.1

Direction: Complete the list of measurement and conversions. Use extra paper for your computation. Write the answer in your answer sheet.

1. 1 quart = _____ cups
2. 12 tbsp. = _____ cup
3. 1 lb. = _____ grams
4. 14 grams = _____ once
5. 1 pint = _____ tbsp.
6. 1 tbsp. = _____ tsp
7. 1 cup = _____ tbsp
8. 1 pinch = _____ tsp.
9. 2.5 kg = _____ grams
10. 102.1 °F = _____ °C

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 1.1

Presenting Data by Textual Form

Procedure:

Example: (Textual Form)

Marinated Boneless Milkfish

Raw Materials:

Fresh milkfish	- 1 kilogram
Vinegar	- 1 cup
Calamansi juice	- ½ cup
Soy sauce	- ½ cup
Salt	- 5 tablespoons
Sugar	- 5 tablespoons
Black pepper	- 1 tablespoon
Garlic (minced)	- 1 tablespoon

1. Weigh the fish.
2. Split the fish and remove the viscera, backbone, and dorsal fin.
3. Wash the fish in fresh water.
4. Wash again the deboned milkfish and drain for 15 minutes.
5. Soak the deboned milkfish for seven hours in marinated solution of vinegar, salt, sugar, soy sauce, and spices.
6. Pack the boneless milkfish in plastic bags and seal.
7. Freeze them, ready for market.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Activity Sheet 1.1

Presenting Data by Textual Form

Did the student...	YES	NO	N/A
1. collect and interpret the data systematically?			
2. present the data in a more practical and convenient way?			
3. record the data accurately?			

Student's Name _____ Date _____

Comments/Suggestions:

LEARNING OUTCOME 2

Review various formulations.

PERFORMANCE STANDARDS

1. Raw materials and ingredients and percentage formulations are checked/counter checked according to approved specifications and enterprise requirements.
2. Finished products and percentage formulations are reviewed according to approved specifications and enterprise requirements.



What Do You Already Know?

Let us determine how much you already know about reviewing formulation. Take this test.

Pretest LO 2

Multiple Choice

Directions: Write the letter of your answer.

1. A solution which has a uniform composition and property is
 - A. heterogeneous
 - B. homogenous
 - C. concentration
 - D. mixture
2. If you are asked to express concentration, which of these will you use?
 - A. weight of solute per unit of solvent
 - B. ratio
 - C. proportion formulation
 - D. per unit weight of solvent
3. In smoking fish, what ingredients and materials will you prepare and check?
 - A. salt and water
 - B. fish
 - C. both a and b
 - D. none of these
4. What is taken into consideration when preparing curing solution for salting?
 - A. method of salting
 - B. size of fish
 - C. species of fish
 - D. none of these
5. The ratio needed in brine cooking smoked fish is
 - A. 150g to 700ml
 - B. 250g to 800ml
 - C. 200g to 750ml
 - D. 300g to 850ml



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

LO2. FORMULATION AND CONCENTRATION OF SOLUTIONS ACCORDING TO SPECIFICATIONS AND STANDARDS OF THE ENTERPRISE

A solution is a homogenous mixture of substances with variable composition. The substance present in the major proportion is called the solvent, whereas the substance present in the minor proportion is called the solute. It is possible to have a solution composed of several solutes. The process of a solute dissolving in a solvent is called dissolution.

Concentration

The concentration of a solution is defined as the amount of solute present in a given quantity of solvent. The most common way to express concentration is on the basis of the weight of solute per unit weight of solvent. For example, a salt solution may be prepared by dissolving 1.64 grams of sodium chloride in 100 grams of water. The concentration of this solution could also be expressed as 0.0164 grams of NaCl per 1 gram of water, or as 16.4 grams of NaCl per 1,000 grams of water. Thus, a statement of the concentration of a solution does not imply anything concerning the amount of solute or the amount of solvent present, but rather gives the ratio of solute to solvent in terms of some convenient (and arbitrary) units. Because the weight of a sample of a liquid is usually more difficult to determine experimentally than its volume, a practical unit of concentration is the weight of solute in a given volume of the solution. For example, a sugar solution may contain 50 grams of sugar per 100 milliliters of solvent.

Ingredients and Materials to be Checked According to Approved Specifications and Enterprise Requirements

For curing fish/salting fish:

Ingredients : Salt, water
fish

For smoking:

Ingredients : Salt, water
fish (bangus, galunggong, tilapia,
and herring family)

For sugar concentrates

Ingredients : Sugar, calamansi or citric acid
fruit (mango, guava, pineapple)

For fermentation:

Ingredients : Salt
dilis and alamang

Various Formulations and Concentrations of Solutions

- Salting/Curing:

The ratio of salt to fish depends on the method of salting to be applied to the fish. If kench salting is used, the ratio is 1:7 by weight wherein one part of salt is added to seven (7) parts of fish. If brine salting is used, the ratio is 1:4 by weight wherein one part of salt is added to four (4) parts of fish. In dry salting to make brine, you use 1:3 by weight or you add one part of salt to three (3) parts of fish.

- Sugar concentrate:

The ratio of fruit juice or pulp to sugar depends on the degree of the pectin content of the fruit. If the pectin is good, the ratio is 1:3/4 wherein one part of fruit juice or pulp is mixed to three fourths ($\frac{3}{4}$) part of sugar. If the pectin is not good, the ratio is 1:1 wherein one part fruit juice or pulp is mixed with one part of sugar.

- Smoking:

The ratio of salt to water for brining and brine cooking is 250 grams of salt to 800ml water.



How Much Have You Learned?

Self-Check 2.1

Directions: Read carefully the sentences. Then identify the word being describe in each sentence and write it in a blank before the number.

- _____ 1. It is the amount of solute present in a given quantity of solvent.
- _____ 2. It is the total amount spent for goods or services including money and time and labor.
- _____ 3. It is the cost of raw ingredients.
- _____ 4. It refers to the combined costs of raw material and labor incurred in producing goods.
- _____ 5. It is a material that allows molecules of one kind to pass through it but prevents the passage of other kinds of molecules.
- _____ 6. It refers to the homogenous mixture of substances with variable composition.
- _____ 7. It is a solution which has a uniform composition and property.
- _____ 8. Is the normal range in the percentage of food cost.
- _____ 9. It is a solution of salt and water wherein fish is soaked and cooked before finally smoking it.
- _____ 10. It is the process of a solute dissolving in another solute.

Refer to the Answer Key. What is your score?



How Do You Extend What You Have Learned?

Show that you learned something by doing this activity

Multiple Choice

Directions: Read carefully the questions. Choose the answer from the options given.

Write the letter only in your answer sheet.

1. If you buy $\frac{1}{4}$ kilo of sugar to be used in pickling how much is this in grams?
 - a. 250 g
 - b. 270 g
 - c. 260 g
 - d. 280 g
2. You are instructed to process fermented fish. What is the ratio needed to ferment fish and salt by weight?
 - a. 1:4
 - b. 1:5
 - c. 1:6
 - d. 1:7
3. In smoking fish, how many grams of salt is equivalent to one cup?
 - a. 250 g
 - b. 270 g
 - c. 260 g
 - d. 280 g
4. In your laboratory room, your group leader asks you to prepare the mixture for mango jam. What is the proportion needed?
 - a. 1:1 and $1\frac{3}{4}$
 - b. 1:2 and $1\frac{1}{2}$
 - c. 1:2 and 1:2
 - d. 1:1 and $1\frac{1}{4}$
5. Using 1:3 ratio in salting fish, how many grams of salt is needed to salt the fish weighing 900 grams?
 - a. 300 g
 - b. 400 g
 - c. 500 g
 - d. 200 g

LEARNING OUTCOME 3

Calculate the production input and output.

PERFORMANCE STANDARDS

1. Data on actual spoilage and rejects and corresponding percentage equivalents are calculated according to enterprise requirements.
2. Data on actual yields and recoveries and corresponding percentage equivalents are calculated according to enterprise requirements.
3. All calculated data are recorded according to enterprise requirements.



What Do You Already Know?

Let us determine how much you already know about calculating the production input and output . Take this test.

Pretest LO 3

Multiple Choice

Directions: Read carefully the questions. Choose the answer from the options given.

Write the letter only in your answer sheet.

1. If you buy $\frac{1}{4}$ kilo of sugar to be used in pickling how much is this in grams?
 - a. 250 g
 - b. 270 g
 - c. 260 g
 - d. 280 g
2. You are instructed to process fermented fish. What is the ratio needed to ferment fish and salt by weight?
 - a. 1:4
 - b. 1:5
 - c. 1:6
 - d. 1:7
3. In smoking fish, how many grams of salt is equivalent to one cup?
 - a. 250 g
 - b. 270 g
 - c. 260 g
 - d. 280 g
4. In your laboratory room, your group leader asks you to prepare the mixture for mango jam. What is the proportion needed?
 - a. 1:1 and $1\frac{3}{4}$
 - b. 1:2 and $1\frac{1}{2}$
5. Using 1:3 ratio in salting fish, how many grams of salt is needed to salt the fish weighing 900 grams?
 - a. 300 g
 - b. 400 g
 - c. 500 g
 - d. 200 g



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 3.1

LO3. Calculating Data on Raw Materials or Ingredients Consumption and Corresponding Percentage Equivalent in Line with Enterprise Requirement

Data gathering on raw materials and ingredients is necessary in order to compute and calculate production input and output of the finished product. The following are examples of data that are gathered based on the products to be done.

1. Pickled Mixed Vegetables

Data:	<i>Item</i>	<i>Weight</i>
	Sugar	250 g
	Vinegar	250 ml
	Salt	15 g
	Carrots	150 g
	Sayote	250 g
	Bell pepper	75 g
	Garlic	50 g
	Ginger	50 g
	Onion	75 g

2. Smoked Fish

Data:	<i>Item</i>	<i>Weight</i>
	Bangus	1 kg
	Salt	250 g
	Water	800 ml

3. Mango Jam

Data:	<i>Item</i>	<i>Weight</i>
	Mango pulp	1 cup
	Sugar	1 or $\frac{3}{4}$ c
	Calamansi juice	1 tsp

4. Fermented fish

Data:	<i>Item</i>	<i>Weight</i>
	Fish or alamang	4 kilos
	Salt	1 kilo

5. Pickled Fish

Data:	<i>Item</i>	<i>Weight</i>
	Fresh milkfish	1 kilogram
	Vinegar	1 cup
	Calamansi juice	$\frac{1}{2}$ cup
	Soy sauce	$\frac{1}{2}$ cup
	Salt	5 tbsp
	Sugar	5 tbsp
	Black pepper	1 tbsp
	Garlic (minced)	1 tbsp

ACTUAL SPOILAGE/REJECTS

Actual spoilage rejects and their corresponding percentage depend on the product to be made.

For example, in mango jam, spoilage refers to the peel of mango and seeds. The products left during packing are not classified as spoilage rejects. In pickled fish, the skin of the calamansi, garlic and the intestinal organ of fish are included in the spoilage. In smoked fish, the intestinal organ is the reject. Lastly, in fermented fish and other fishery product, small seashell, small stone and seaweeds are the spoilage.

ACTUAL YIELD AND RECOVERIES

Yield refers to the number of finished products after computing for the production output and input.

Formula for getting the percentage yields

$$\% \text{ Yield} = \frac{\text{production input}}{\text{production output}} \times 100\%$$

Record's Calculated Data

Report/records based on the data gathered and computed on production output, input, actual spoilage, rejects, actual yields or recoveries are kept for documentation purposes. This will be the basis for determining the progress of whatever products to be done on process.



How Much Have You Learned?

Self-Check 3.1

Direction: Identify the following. Write your answer on the space provided for.

1. _____ refers to the number of finished products after computing for the production output and input.
2. _____ is the proportion applied in preparing mango jam.
3. _____ is the ratio by weight of salt to fish in fermentation.
4. _____ is the weight of 1 cup salt in grams.
5. _____ is the ratio applied in dry salting to make brine.

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 4

Compute the costs of production.

PERFORMANCE STANDARDS

1. Costs of production are computed according to standard procedures
2. Computed costs of production are reviewed and validated according to enterprise production requirements.



What Do You Already Know?

Let us determine how much you already know about computing the cost production. Take this test.

Pretest LO 4

Multiple Choice

Directions: Choose the word or words that is described in each sentence. Write the letter only in your answer sheet.

1. It is a systematic procedure of producing a record for reference
 - A. output
 - B. production report
 - C. documentation
 - D. input
2. It is something that enters a process from the outside and is acted upon or integrated in the main body of data.
 - A. production report
 - B. output
 - C. input
 - D. documentation
3. Anything produced especially through a process; a product; a yield.
 - A. documentation
 - B. input
 - C. output
 - D. production report
4. A written record showing the input – output relationship in determining the yield from a certain procedure.
 - A. input
 - B. output
 - C. production report
 - D. documentation
5. It is the process of capturing data or translating information to recording format.
 - A. documentation
 - B. reporting
 - C. production report
 - D. output



What Do You Need To Know?

Read the Information Sheet 4.1 very well then find out how much you can remember and how much you learned by doing Self-check 4.1.

Information Sheet 4.1

LO4. IMPORTANCE OF RECORDING AND DOCUMENTING PRODUCTION INPUT

1. It gives us a reference data on the materials used together with their correct magnitude.
2. It determines the economic viability of the product.
3. Records serve as a basis for planning.
4. Records greatly help in making right decisions.

Steps in recording and documenting production input are as follows:

First, weigh all materials and ingredients needed.

Second, make a necessary listing in your notebook of all the materials and ingredients used. It is important to note how much or how many. This is what we call recording or documentation.

Third, follow the correct format in documenting and recording.

Sample of Production Report

Product Name: Pickled / Marinated Milkfish	
Production Date: February 26, 2012	
Description of Materials:	
Fresh Milkfish	1000 g
Other Ingredients:	
Distilled vinegar	250 g
Calamansi juice	125 g
Soy sauce	125 g
Salt	75 g

Sugar	75 g
Black pepper	15 g
Minced garlic	15 g
Input:	1680 g
Output: Marinated Fish	1200 g
Wastage	480 g
Percentage Yield	71 %
Problem Encountered: NONE	

Sample of Production Cost

Product: Pickled Mixed Vegetables

I – Raw Materials and Ingredients

Items	Quantity	wt/ml /gms	Cost (₱)
Chayote	3 kls.	3 000 gms.	60.00
Carrots	6 pcs.	550 gms.	30.00
red bell pepper	4 pcs.	80 gms.	5.00
Ginger	4 pcs.	270 gms.	10.00
Garlic	2 pcs.	100 gms	5.00
Onion	3 pcs.	165 gms	10.00
Sugar	1½ cups	275 gms	25.00
Vinegar	1½ cups	400 gms	10.00
Raisins	1 pack	100 gms	25.00
Salt	1 cup	150 gms	2.00
TOTAL			202.00

II. Packaging Materials

1. Preserving jars	8 pcs. x ₱ 5.00 = ₱ 40.00
2. Label	8 pcs. x ₱ 1.00 = <u>₱ 8.00</u>
	= ₱ 48.00

III. Overhead Expenditures

1. LPG / fuel for cooking	₱ 2.00
2. Transportation	₱ 7.00
3. Water	<u>₱ 10.00</u>
	= ₱ 19.00

Grand Total = ₱ 269.00

IV. Number of finished products	-	8 jars
V. Net Weight	-	250 gms
VI. Mark up price (20 % of Grand Total)	-	₱ 53.80
VII. Selling Price	-	₱ 40.35



How Much Have You Learned?

Self-Check 4.1

Matching Type

Directions: Match the item in column A with those in column B. Write the letters only.

A	B
1. output	a. something that enters process from the outside and is acted upon or integrated in the data
2. recording	b. the end product or yield of a process
3. input	c. a written record showing the input – output relationship in determining the yield from a certain procedure
4. production report	d. a systematic procedure of producing a record for reference
5. documentation	e. the process of capturing data or translating information to recording format

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 4.1

Prepare a Production Cost from the Given Format

Production Cost

Product: _____

I – Raw Materials and Ingredients

Items	Quantity	wt/ml /gms	Cost (₱)
TOTAL			

II. Packaging Materials

1. Preserving jars
2. Label

= ₱ _____
 = ₱ _____

= ₱ _____

III. Overhead Expenditures

- 1. LPG / fuel for cooking
- 2. Transportation
- 3. Water

₱
₱
₱

= ₱

Grand Total = ₱ _____

IV. Number of finished products - _____

V. Net Weight - _____

VI. Mark up price (20 % of Grand Total) - ₱ _____

VII. Selling Price - ₱ _____



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Activity Sheet 4.1

Preparing a Production Cost

Did the student...	YES	NO	N/A
1. record the spoilage and rejects of raw materials and ingredients in preparing production report?			
2. prepare a production cost based on the given format?			

Student's Name _____ Date _____

Comments/Suggestions:



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

REFERENCES

LO1

- CBLM – Fish Processing II, pp. 2 – 13

LO 2

- CBLM – Fish Processing II, pp. 15 – 17

LO 3

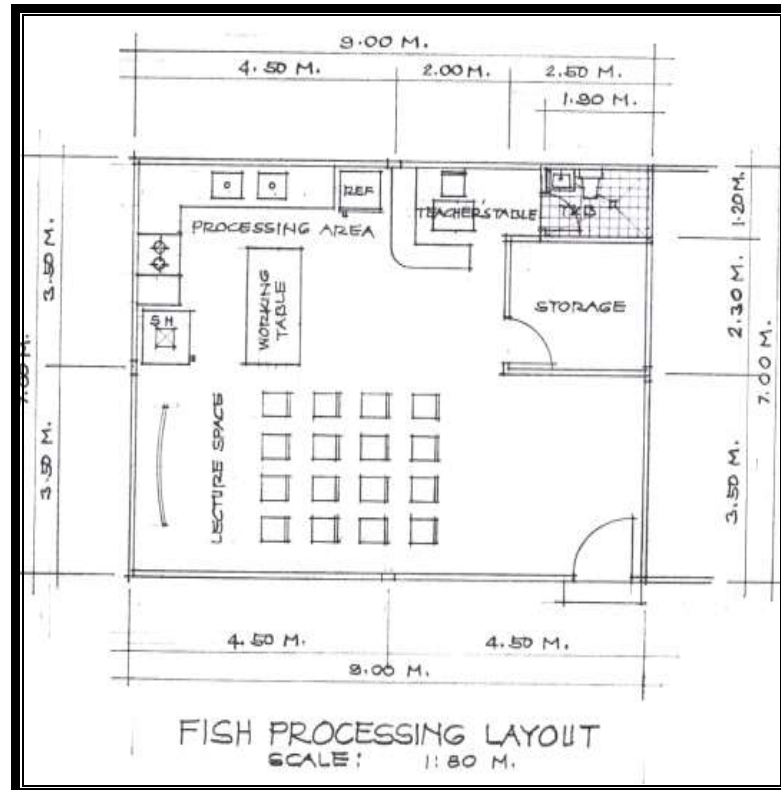
- CBLM – Fish Processing II, pp. 20 – 21

LO 4

- CBLM – Fish Processing II, pp. 54 – 56

LESSON 3

Interpret Plans and Drawings



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1. Interpret lay-out plan and;
- LO2. Perform outer packaging procedures



Definition of Terms

Label – any tag, brand, mark, pictorial, or other descriptive written mater.

Layout – the way facilities are placed according to a plan.

Labeling – attaching of any printed materials to food products for identification.

Laminates – are made of two or more basic films held together by adhesives. They provide better protection to food due to improved barrier properties.

Layout – the way facilitates are placed according to a plan.

Specification – a detailed itemized description of dimension plans, materials, and other requirement.

Vacuum packaging – may be defined as taking of air from the container during sealing in order to preserve the products.

LEARNING OUTCOME 1

Interpret lay-out plan

PERFORMANCE STANDARDS

1. Lay –out plans of fish processing area are interpreted based on set standards.
2. Signs and symbols are translated according to established standards.



What Do You Already Know?

Let us determine how much you already know about interpreting lay-out. Take this test.

Pretest LO 1

Directions:

Read and understand the questions below. Select the best answer for each item and write your choice on your answer sheet. Do not write anything on the module.

1. This processing activity involves pre-cooking.
 - A. storing
 - B. receiving
 - C. preparation
 - D. processing
2. This activity involves the final heat treatment during processing.
 - A. sterilizing
 - B. storing
 - C. preparation
 - D. labeling
3. This activity involves segregating suitable from unsuitable raw materials.
 - A. grading and sorting
 - B. labeling
 - C. receiving
 - D. preparation
4. The purpose of this activity is to give the correct information about the product.
 - A. storing
 - B. labeling
 - C. processing
 - D. receiving
5. One purpose of this processing activity is to prolong the keeping quality of the finished product.
 - A. labeling
 - B. storing
 - C. processing
 - D. preparation



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

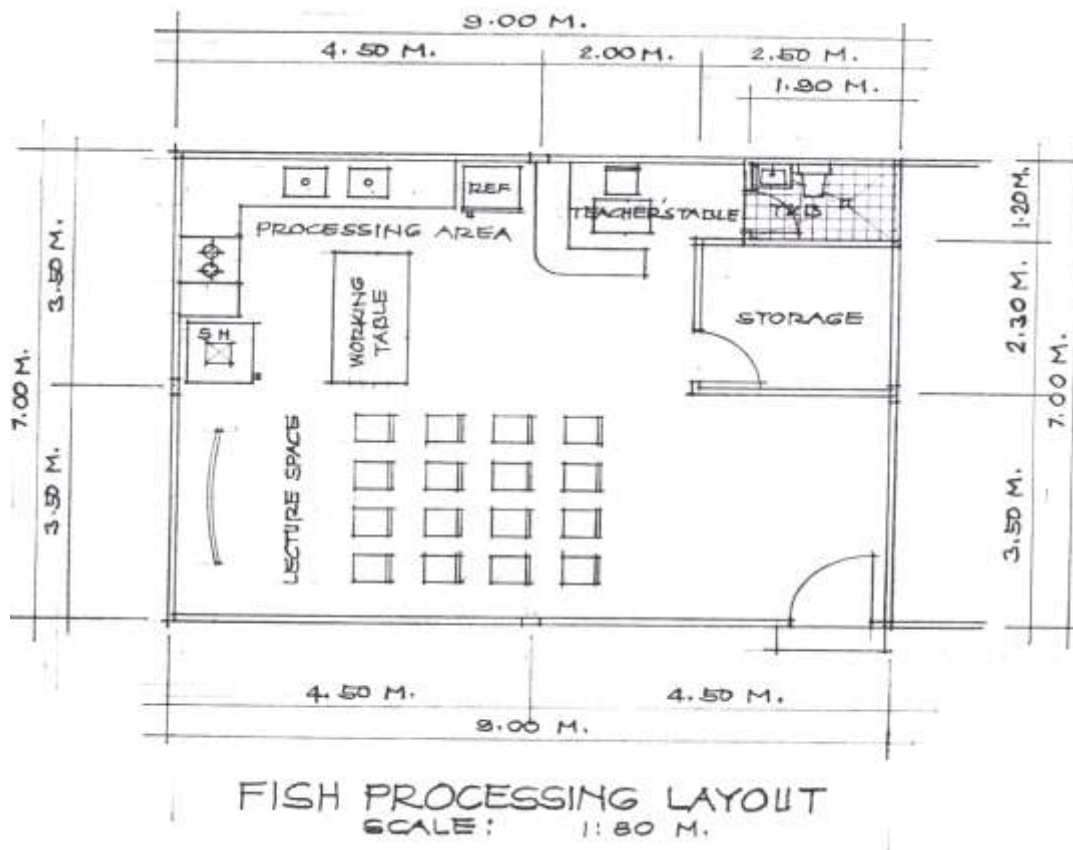
Information Sheet 1.1

LO1. ENUMERATE AND DESCRIBE THE FISH PROCESSING ACTIVITIES IN AN ORDERLY MANNER.

Fish Processing Activities

1. Receiving. This activity includes sorting and grading of raw materials according to size, species, and quality. It also includes segregating suitable from unsuitable ones.
2. Preparation. This includes the preparatory steps such as washing, eviscerating, cutting, brining, and pre-cooking the fish by steaming, blanching, or broiling.
3. Processing/sterilizing. This activity involves the final processing and complete sterilization of the processed finished product.
4. Storing. Storage room is provided for storing finished product such as canned/ bottled fish, smoked fish, salted fish, pickled fish and other processed fishery products. Proper storage will also extend the shelf life of the product.
5. Packaging. This processing activity involves the wrapping or enclosing food and fish products in bottles or in cans for the purpose of protecting and preserving the finished products.
6. Labeling. The purpose of this activity is to give the correct information about the product.

LAYOUT OF AN IDEAL PROCESSING ROOM





How Much Have You Learned?

Self-Check 1.1

Directions: Identify the following. Write your answer on the space provided for.

1. _____ includes washing, cooking.
2. _____ involves the final heat treatment during processing.
3. _____ involves segregating suitable from unsuitable raw materials.
4. _____ is a processing activity which purpose is to give the correct information about the product.
5. _____ is done keeping quality of the finished product.
6. _____ is a way of placing facilities according to a plan.
7. _____ is an itemized description of dimension plans, materials, and other requirements.
8. _____ is attaching any printed materials to food products for identification.
9. _____ is any tag, brand, mark, pictorial, or other descriptive written matter attached to a product.
10. _____ may be defined as taking of air from the container during sealing in order to preserve the products.

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 1.1

Flowchart in the manufacture of smoked Bangus

Procedure:

1. Securing of raw materials
2. Preparing the raw materials
 - a. splitting
 - b. brining
 - c. pre-cooking
 - d. drying
3. Smoking
4. Cooling
5. Packaging

Legend:

 **Technology Process**

 **Related Process**

 **Temporary Delay**



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Activity Sheet 1.1

Flow Chart in the Manufacture of Smoked Bangus

Did the student...	YES	NO	N/A
1. identify the proper legend in preparing a flow chart?			
2. enumerate the fish processing activities in an orderly manner?			

Student's Name _____ Date _____

Comments/Suggestions:

LEARNING OUTCOME 2

Perform outer packaging procedures

PERFORMANCE STANDARDS

1. Fish products are packaged according to requirements and packaging standard procedures.
2. Packaged fish products are labeled according to quality control standards



What Do You Already Know?

Let us determine how much you already know about perform outer packaging procedures. Take this test.

Pretest LO 2

Directions:

Choose and encircle the letter of the correct answer.

1. Which of the following does not belong to the group?

- A. polyvinylchloride C. polystyrene
- B. expanded polystyrene D. polypropylene

2. Packaging material which is resistant to high temperature but poor quality in low temperature and becomes brittle.

- A. polyethylene C. polystyrene
- B. polypropylene D. polyamide

3. Packaging material which is hard and glossy but grease resistant and brittle at all temperatures.

- A. polyamide C. polyvinylidene chloride
- B. ethylene-vinyl chloride D. polyvinyl chloride

4. Packaging container which is effective in chilling fish because it can resist extreme heat and can retain coldness inside.

- A. polyethylene C. polystyrene
- B. polypropylene D. polyamide

5. Which of the following is optional label requirement?

- A. nutrition facts C. vignette
- B. ingredients D. expiry date



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

LO2. DIFFERENT PACKAGING MATERIALS FOR FISH PRODUCTS

Packing of fish and other products is defined as a wrapping or enclosure of fish and other products in attractive and colorful materials for the purpose of protection and preservation of products as well as to give eye appeal to the consumers / buyers.

Packaging protects the products from any form of loss, damage, deterioration, or spoilage and contamination during handling and distribution.

Attractive package gives good eye appeal to the consumer / buyer. Good package promotes good market of the product, thus, suitability and profitability of the product occur. Packaging extends shelf-life of fishery products. For instance, vacuum - packed dried fish will last for a year due to no oxidation. Good packaging materials serves as a medium of communication to the consumer / buyer especially the complete information stated on the label about the product. This eliminates high labor cost and improves marketing aspect. It is also easy to handle, open, use, and dispose. Lastly, a good packaging material fits into the cabinets, shelves, freezers, refrigerators, and other storage areas.

Different packaging materials for fish products.

1. Hard Plastics

Hard plastics are not flexible or elastic which are used for retail packaging in the production of trays and form-fill packs of fishery products.

Likewise, hard plastics are light, durable, and resistant to corrosive substances and water. They are manufactured using polystyrene, expanded polystyrene and polyvinyl chloride (Subansinghe, 1993).

Polystyrene. This is transparent and has low obstruction to water vapor and gases. When treated with other materials like synthetic rubber, this can be easily shaped and molded with pressure.

Expanded polystyrene. This is treated with polystyrene pellets wherein the pellets are heated in steam to expand the material in order to produce a cellular shape. This is used for tray molding.

Polyvinyl Chloride (PVC). There are two types of PVC, namely, plasticized and rigid. Plasticized PVC are soft plastics and used in the making of films. Rigid PVC is hard and is used in the production of trays due to its water proof and gas barrier properties.

2. Films

Films are web materials with thickness of 0.25mm. Materials more than 0,25 mm thickness are called **sheet**. In choosing plastic films for packaging, the specific properties such as tensile strength, puncture resistance, flex/crack resistance, water vapor and gas barrier, clarity, and gloss and heat sealability (Hermes, 1998).

Films are classified into two groups, namely, basic and laminates. Basic films consist of single layers film. Laminates contain two or more basic films glued or bonded together by heat or adhesive (Hermes, 1998).

Basic Films.

Below are different types of basic films

1. **Polyethylene (PE).** PE is also called as polyethylene and used commonly due to its low cost, relative strength and flexibility even at low temperature (Hermes, 1998). PE is heat sealable but cannot be utilized in the manufacture of boil-in-bag pouches (Bremmer, 1985).
2. **Polypropylene (PP).** PP has better protective properties because it is resistant to high temperature. However, it has poor qualities in low temperature and becomes brittle (Pane and Pane, 1983).
3. **Polyamide (PA).** This is commonly called as nylon PA which is tough, grease-resistant, less permeable to gases, and has a moisture permeability. It also possesses good stretch properties and is stable over a wide range of temperatures, hence it can be used in boil-in-bag pouches ((Hermes) 1998).
4. **Polyester (PET).** It has excellent gloss, low gas permeability, low moisture transmission, high tensile strength, and can be used in a very wide range of temperatures up to 300°C. It is oftentimes laminated with polyethylene due to its poor heat sealing properties (Kail. 1985).
5. **Polyvinyl chloride (PVC).** This is hard and glossy, but grease resistant and brittle at all temperatures. Its film can be made into shrinkable forms with low temperature stability by using special treatment methods (James, 1985).
6. **Polyvinylidene chloride (PVDC).** This is commercially known as *saran* or **Cryovacs**. This is one of the most protective films because it is shrinkable and capable of withstanding low freezing temperature. (Samuels, 1985).

7. **Ethylene-vinyl acetate (EVA).** This has good impact strength, good permeability and high cling attributes. The material is used in the lamination of frozen products (Hermes, 1998).

Laminates

Laminates are made of two or more basic films held together by adhesives. They provide better protection to food due to improved barrier properties. They are used in (1) boil-in-bag, and (2) retort pouch pack.

1. **Boil-in-bag.** The suitable material in this type of container is modified polyethylene with polyester or nylon lamination. This is commonly used for light cooking fishery products.
2. **Retort pouch pack.** This is made from laminates of polyester/aluminum film and polyolefine like polyethylene. The layers are bonded together with glue of high performance. Its use is preferable due to less heat damage of texture and nutrient.

Plastic Box Packaging Containers.

Plastic is used to characterize a wide range of materials like **polyethylene** and **polypropylene**. High density polyethylene and polypropylene are widely used in the manufacture of modern day containers (Subasinghe, 1993). Plastic box packaging containers are classified into (1) polyethylene, (2) polypropylene, and (3) polystyrene or styrophore.

1. **Polyethylene.** This is classified into low density (0.910 g/cm^3 to 0.925 g/cm^3) and high density. High polyethylene is divided into two types namely, Type III with density of 0.941 g/cm^3 to 0.959 g/cm^3 and Type IV with density of 0.960 g/cm^3 and above (Wheaton and Lawson, 1985).

By and large, polyethylene has excellent toughness being resistant to chemicals, oil, and grease, inert to food, and has extremely low water vapor transmission properties (Hermes, 1998).

Moreover, high density polyethylene containers are effective in the chilling of fish. These containers can resist extreme heat and cold because they can retain coldness inside.

2. **Polypropylene.** This has high resistance to grease and most chemicals, provides a good barrier to water vapor, and can withstand high temperatures due to high softening point, but has low density around 0.9202 g/cm^3 and superior processability (Murray and Gibson, 1971).

Likewise, polypropylene is lighter, stronger and more rigid than polyethylene.

3. Polystyrene or styrofoam. Polystyrene are penetrable to water vapor, oxygen and carbon dioxide and has low water absorption around 0.04 % to 0.05%.

Normally, polystyrene has density of 1.0g/cm³ to 1.1g/cm. Chemically it is resistant to weak acids like pH 6.0 to pH 6.5, bases, and vegetable oils.

Locally, polystyrene boxes are popular for transporting of fish from the wharf to the market or processing plant. But they are difficult to clean because of the trapped container water in the ridges and are not durable especially if pores are damaged.

However, modified polystyrene fish containers using moulded plastic around showed 10-15% better insulating properties than the ordinary polystyrene box (Villadsen, Milla and Flores, 1986).

Vacuum Packaging

Vacuum Packaging may be defined as taking off oxygen from the container during sealing in order to preserve the products.

Packaging materials like polyamide/polythene laminates are suitable for vacuum packaging for they are resistant to pinhole formation (Hermes, 1998).

The advantages of vacuum-packed products are as follows:

1. Vacuum-packed products have longer shelf-life than ordinary packed products due to non-occurrence of oxidation.
2. They have better keeping quality especially on dried fish wherein no rancidity occurs.
3. They demand high price in the market.

The disadvantages of vacuum-packed products are the following:

1. Vacuum-packed products are not applicable to fish roe and mussel meat.
2. The label of the vacuum-packed products are not readable due to deformity of the surface of the pack.
3. Vacuum-packed products should be refrigerated below 3°C or 37.4°F to prevent production of toxin by *clostridium botulinum*.

Vacuum Skin Packaging.

Vacuum skin packaging is an extension vacuum packaging which can be applied to both film-to-film and film-to-tray sealing (Hermes, 1998). The wrapper is heated and draped over the product. hence, giving extra "skin".

The steps in preparing vacuum skin packing are as follows (Hermes 1998).



How Much Have You Learned?

Self-Check 2.1

Directions:

Choose and encircle the letter of the correct answer.

1. This packaging material is resistant to high temperature but has poor quality in low temperature and becomes brittle.

- A. polyethylene
- B. polypropylene
- C. polystyrene
- D. polyamide

2. Which of the following does not belong to the group?

- A. polyvinylchloride
- B. expanded polystyrene
- C. polystyrene
- D. polypropylene

3. This packaging containers are popular for transporting fish from the wharf to the processing plant but difficult to clean due to the trapped water in the ridges.

- A. polyethylene
- B. polystyrene
- C. polypropylene
- D. polyamide

4. This container is effective for chilling fish because it can resist extreme heat and can retain coldness inside.

- A. polyethylene
- B. polypropylene
- C. polystyrene
- D. polyamide

5. Which of the following is considered an optional label requirement?

- A. 250 grams
- B. October 2009
- C. fat
- D. Ligo

6. This packaging material is used for the lamination of frozen products.

- A. polyamide
- B. polyvinyl chloride
- C. ethylene-vinyl acetate
- D. polyester

7. Which of the following is required in preparing label?

- A. fish illustration
- B. tomato growing
- C. "555"
- D. 155 grams

8. Which of the following does not belong to the group?

- A. product of USA
- B. fish drawing
- C. lucky 7
- D. purefoods

9. This packaging material is hard and glossy but grease resistant and brittle at all temperatures.

- A. polyamide
- B. ethylene-vinyl chloride
- C. polyvinylidene chloride
- D. polyvinyl chloride

10. Which of the following is an optional label requirement?

- A. nutrition facts
- B. ingredients
- C. vignette
- D. expiry date

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 2.1

Make a Label for Canned Fishery Product

Procedure:

1. Prepare the necessary tools and materials for making a label.
2. Cut the paper according to the size of the container (tin can).
3. Draw an illustration about the product that attracts the buyer or consumer.
4. Write or print the necessary parts of a label like:
 - Name of the product
 - Name of manufacturer
 - List of ingredients in descending order
 - Net weight of the product
 - Country of manufacturer
 - Expiry date marking
 - Nutrition facts
 - Brand name
5. Attach the label on the tin can.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Activity Sheet

Make a Label for Canned Fishery Product

Did the student...	YES	NO	N/A
1. use necessary and proper materials in making a label?			
2. demonstrate the proper technique in making a label?			
3. perform task independently?			

Student's Name _____ Date _____

Comments/Suggestions:



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

REFERENCES

LO1

- CBLM (Fish Processing II)

LO 2

- CBLM – Fish Processing IV, pp. 4 – 8

LESSON 4

APPLY FOOD SAFETY AND SANITATION



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1. observe personal hygiene and good grooming;**
- LO 2. implement food safety practices;**
- LO 3. conduct work in accordance with environment policies and procedures; and**
- LO 4. participate in improving environmental practices at work.**



Definition of Terms

Brine solution – the mixture of salt and water.

Critical Control Point (CCP) – is a point in time or a physical location at which failure of control or preventive measures will expose the consumer to unacceptable health risk.

Debris – remains of something that has been destroyed.

Disasters – the impact of natural or man-made hazards that negatively affect society or environment.

Epidemiological – describes the origin and development of a particular disease.

Food borne illness – a kind of illness acquired by eating contaminated foods.

Food handlers – persons who handle food during food production.

Food hygiene – all conditions and measures necessary to ensure the safety and suitability of the food preparation and processing.

Food safety – the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

Good grooming – the art of cleaning and maintaining proper and neat appearance of the body.

Good Manufacturing Practices (GMP) – potable water refers to drinkable water.

Hazard – a situation which possess a level of threat to life, health, property or environment.

Hazard analysis – is the identification of selective ingredients, critical process points and relevant human factors as they affect product safety.

Hygiene – the science of good health that signifies cleanliness and freedom from the risk of infectious disease.

Input – something that enters a process from the outside and is acted upon or integrated.

Labeling – the process of putting labels on the immediate container.

Mitigation – a measure that is used to minimize the damaging effect of an emergency.

Output – is the amount produce/yield.

Oxidation – an action in which oxygen combines with an element or compound.

Rehabilitation – the process of restoring land after some process (business, industry, natural disaster, etc.) has damaged it.

Sanitation – is the planned maintenance of the work and product environment to prevent or minimize hazards of product contamination, condition and to provide clean, healthful, and safe working conditions.

Standard Operating Procedures (SOP) – the set of practices, procedures, and rules designed for the promotion and maintenance of health and cleanliness in the processing plant.

Spill – the release of a liquid petroleum hydrocarbon into the environment due to human activity.

LEARNING OUTCOME 1

Observe personal hygiene and good grooming

PERFORMANCE STANDARDS

1. Personal hygiene and good grooming is practiced in line with workplace health and safety requirements.
2. Personal protective equipment is cleaned, checked and sanitized.



What Do You Already Know?

Let us determine how much you already know about observing personal hygiene and good grooming. Take this test.

Pretest LO 1

Directions: Read each statement carefully and choose the letter of the best answer.

1. What illness is acquired by eating contaminated food?
A. air borne illness
B. food borne illness
C. Skin disease
D. Lung illness
2. Which of the following refers to the science of good health that signifies cleanliness and freedom from the risk of infectious diseases?
A. hazards
B. sanitation
C. hygiene
D. cleanliness
3. When do personnel wash their hands wherein personal cleanliness may affect food safety?
A. at the start of food handling activities
B. immediately after using the toilet
C. after handling raw food or any contaminated material
D. all of the above

4. Which of the following is the concern of personnel hygiene?
- A. freedom from any diseases
 - B. wearing of clean washable garments
 - C. observing sanitary habits and clean hands
 - D. all of these
5. Which of the following is not a GMP requirement on personnel hygiene?
- A. hazard analysis
 - B. health status
 - C. illness and injuries
 - D. Personal cleanliness



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

LO1. OBSERVE PERSONAL HYGIENE AND GOOD GROOMING

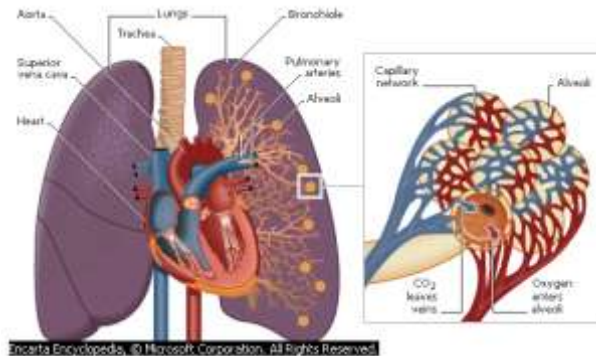
GMP Requirements on Personal Hygiene

1. Health Status. People known, or suspected, to be suffering from, or to be a carrier of a disease should not be allowed to enter any food handling area. It is likely that they could contaminate food. Any person so affected should immediately report illness or symptoms of illness to the management.

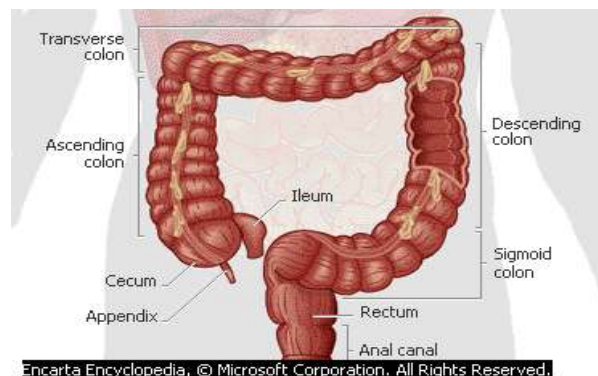
Medical examination of a food handler should be carried out, if clinically or epidemiologically indicated.

2. Illnesses and Injuries. The following conditions should be reported to the management so that any afflicted persons need to subject themselves to medical examination and be excluded from handling food.

- a. Diseases of the respiratory tract, such as common cold, sore throat, pneumonia, scarlet fever, tuberculosis, and trench mouth. Respiratory tract infections spread microorganisms such as staphylococci, which are indigenous to portions of the respiratory tract.



- b. Intestinal disorders, such as dysentery, typhoid fever and infectious hepatitis. People suffering from intestinal disorders usually shed a lot of intestinal bacteria such as Shigella, Salmonella, etc. which may be transmitted to food by dirty hands. A person suffering from salmonellosis for example, may shed as many as 10 cells per gram of feces, during illness (ICMSF, 1988).



- c. Skin disorders, such as sores, abrasions, and lesions, infected ears, boil, scabies and severe rashes. The usual sites for harboring staphylococci are cuts, burns, abrasion, and pustular lesions. When infected persons handle food, the hazard of passing staphylococci from skin surfaces to food increases. Pre employment physical examination is usually required for every person intending to work in a food plant in order to establish freedom from above diseases.
3. Personal Cleanliness.
Food handlers should maintain a high degree of personal cleanliness. They should wear suitable protective clothing, head covering, gloves, facial masks, and footwear. Suitable waterproof dressing should cover cuts and wounds, wherein personnel are permitted to continue working.

Processor's Outfit as Part of Personal Hygiene



Apron



Hairnet



Hand Towels



Gloves

Hand Washing

Personnel should always wash their hands when personal cleanliness may affect food safety, as shown in the following practices:

- a. At the start of food handling activities.
- b. Immediately after using the toilet
- c. After handling raw food or any contaminated material, where this could result in the contamination of other food items. They should avoid handling ready-to-eat food when unsure of cleanliness in the process of preparing it.



Personal Behavior or Habits

People engaged in food handling activities should refrain from behavior that could result in food contamination, such as the following:

- d. Smoking
- e. Spitting
- f. Chewing or eating
- g. Sneezing or coughing over unprotected food

Personal effects such as jewelry, pins or other items should not be worn or brought into food handling areas if they pose a threat to the safety and suitability of food.

Visitors

Visitors in food manufacturing, processing or handling areas should, where appropriate, wear protective clothing and adhere to the other personal hygiene provisions.

Entrance and Exit in a Workplace

1. All entrances and exits must be provided with screened doors swinging outward.
2. Signs of entrance and exit must be posted in corresponding areas.
3. Some organizations require thorough washing of hand and foot bath before entry into a work area.
4. Wear appropriate work outfit before entry. Deposit them at designated areas upon exit from the place.



How Much Have You Learned?

Self-Check 1.1

Directions:

Write TRUE if the statement is correct and FALSE if the statement is wrong.

- _____ 1. Food handlers should maintain a high degree of personal cleanliness.
- _____ 2. People suffering from or a carrier of a disease should not be allowed to enter any food handling area.
- _____ 3. Washing of hands should be done after preparation of food.
- _____ 4. Workers should be well-groomed, that is to say, make up is a must for girls.
- _____ 5. Smoking or spitting anywhere is allowed during food preparation.
- _____ 6. A mask should be worn to cover the mouth during food preparation.
- _____ 7. An apron or a laboratory gown that is fitted, cleaned, and pressed must be worn.
- _____ 8. Medical examination of a food handler should be carried out if clinically or epidemiologically indicated.
- _____ 9. Hands should be washed only after using the toilet.
- _____ 10. It is advisable to work or prepare foods even with infected wounds or cuts.

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Operation Sheet 1.1

Hand Washing Techniques as a Means of Practicing

Equipment, Tools and Materials:

- water
- soap
- faucet
- drier
- brush
- towels
- tissue paper
- sanitizer
- alcohol (70% ethanol)

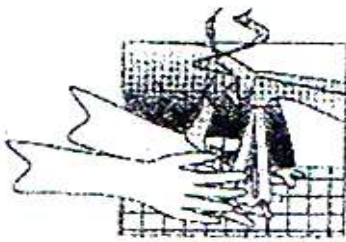
Procedure:

Follow the steps below.

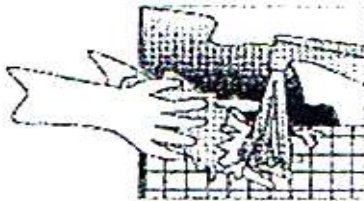
Precautions:

1. Use potable water.
2. Check facilities if functioning properly.
3. Take proper care in using the facilities.

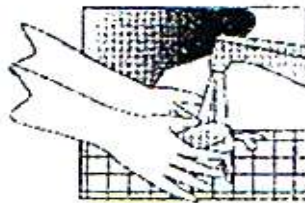
HAND-WASHING TECHNIQUES



1. Use water as hot as the hands can comfortably stand. (or use potable water)



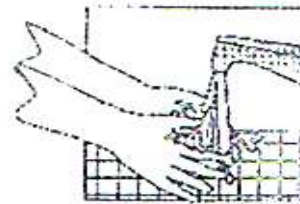
2. Moisten hands, soap thoroughly and lather to elbow.



3. Scrub thoroughly, using brush for nails, for 20 seconds.



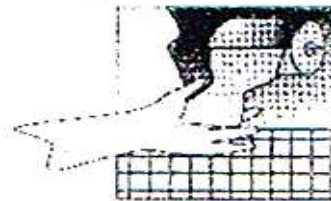
4. Rub hands together, using friction for 20 seconds.



5. Rinse thoroughly under running water.



6. Be careful not to touch anything that recontaminates the hands before returning to work.



7. Dry hands, using single service towels, tissue paper or hot air dryer.



IF NECESSARY:

8. Use disinfectant to sanitize thoroughly with 30 ppm Cl₂ or 70% ethanol.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

**Performance Criteria Checklist for
Operation Sheet 1.1
(Hand Washing Techniques As A Means Of
Practicing Hygiene And Good Grooming)**

Did the student/s...	YES	NO	N/A
1. prepare the facilities as well as the materials and check before using (washing)			
2. demonstrate the proper washing techniques?			

Student's Name _____ Date _____

Comments/Suggestions:

LEARNING OUTCOME 2

Implement food safety practices

PERFORMANCE STANDARDS

1. Sanitary practices in food safety are implemented in line with workplace safety regulations.
2. Cleanliness and sanitation should be strictly observed.
3. Safety measures are applied according to workplace rules and regulations.
4. First aid procedures are applied and coordinated with concerned personnel according to workplace standard operating procedures.



What Do You Already Know?

Let us determine how much you already know about implementing food safety practices. Take this test.

Pretest LO 2

Directions: Encircle the letter of the correct answer.

1. How will you ensure the safety of raw materials particularly the quality of fish in processing especially during handling?
 - A. by checking the source of supplies
 - B. by checking on the quality of the fish
 - C. by monitoring regularly the preparation of fish
 - D. all of these
2. What is the purpose of applying strict quality control in choosing raw materials for processing?
 - A. to prevent inferior finished products
 - B. to produce good finished product
 - C. to produce sound marketable product
 - D. all of the choices
3. How will you ensure that the workers can handle food safely during production?
 - A. workers are not infected with contagious disease
 - B. workers are not wearing their Personal Protective Equipment
 - C. Workers are smoking during preparation/processing of food.
 - D. worker's hands are not thoroughly washed.
4. In keeping equipment and facilities safe and sanitary, what must be considered?
 - A. processing facilities must be well-ventilated
 - B. processing facilities should be adequately lighted and properly maintained
 - C. processing equipment/facilities should be cleaned and disinfected before and after using
 - D. all of the choices

5. Which among the choices includes practices and procedures implemented in processing plants to ensure product safety, product quality and prevention of economic fraud?
- A. GMP
 - B. SSOP
 - C. HACCP
 - D. none of the choices
6. GMP covers 3 accepted standards in the maintenance and safety of the following except one. Which is not included?
- A. production and process control
 - B. worker's hygiene and safety
 - C. housekeeping activity
 - D. good working conditions of equipment and facilities
7. What is the best standard operating procedure in maintaining the safety of equipment and facilities?
- A. thorough washing
 - B. subsequent disinfection before and after using
 - C. both a and b
 - D. none of the choices
8. For the product to be safe, it must be properly labeled. The following information shall be declared in every label except one. Which one is not?
- A. name of product
 - B. name and address of the product
 - C. net weight
 - D. name of the consumer



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

LO2. IMPLEMENT FOOD SAFETY PRACTICES

Sanitation in a processing plant is a primary concern of all food processing firms. It is necessary to prevent or minimize hazards of product contamination and conditions aesthetically offensive to the consumers, and to provide clean, healthful, and safe working conditions.

Sanitation standard operating procedures (SSOP) are components of Good Manufacturing Practices (GMPs) emphasizing sanitation procedures on the topics to be discussed as follows:

Workplace Sanitation Regulation in Implementing Sanitary Food Handling Practices in the Following Aspects;

In handling raw materials and supplies

- Check the source of supplies (fish, salt, packaging materials)
- Check on the quality
 - condition of fish(freshness and temperature
 - presence of foreign materials
 - color and purity of salt
 - purity of other additives

In monitoring during production

- The preparation of fish must be monitored regularly to ensure complete removal of entrails and gills for eviscerated fish and by thorough washing for whole fish.
- The correct brine concentration, amount of other ingredients and the time of soaking must be strictly observed to ensure uniformity of every batch.
- The proper drying or cooking endpoint must be observed to ensure uniformity of product quality.

- In packaging for retail packs, proper packing of products in polyethylene(PE) or polypropylene(PP) bags must be checked.

For bulk packs, check if product is properly stacked in carton boxes or wooden (palochina) boxes that are lined with high density polyethylene plastic film.



- In labeling, check if it carries appropriate labeling in accordance with the rules and regulations on labeling of pre-packaged foods. The following information shall be declared in every container whether in bulk or in retail package.

Nutrition Facts	
Serving Size 1 cup (220g) Serving Per Container 2	
Amount Per Serving	
Calories 250	Calories from Fat 110
% Daily Value*	
Total Fat 12g	24%
Saturated Fat 8g	16%
Trans Fat 1.5g	
Cholesterol 30mg	60%
Sodium 40mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	7%
Vitamin D	14%
Calcium	20%
Iron	4%

Total Fat 2g	5%
Saturated Fat 0.5g	29%
Trans Fat 0g	6%
Cholesterol 15mg	4%
Sodium 700mg	
Total Carbohydrate 19g	
Dietary Fiber 1g	
Sugars 0g	
Vitamin A	
Vitamin D	
Calcium	
Iron	

For locally produced products:

1. The name of the product and product identification (generic name), printed in bold capital letters.
2. Name and address of the manufacturer
3. Net weight (in metric units)
4. Ingredients (itemized in decreasing order)
5. Chemical additives e.g. preservatives
6. Open date marking e.g. “Best before” or “Consume before Date”
7. Lot Identification Code (Repackers must use manufacturer’s lot I.D. code)
8. Storage instruction: *Store in a cool dry place.*

For locally manufactured/repacked and imported/repacked products:

1. Same as in numbers 1, 3 to 8.
2. Name and address of manufacturer/repacker/importer

3. Country of origin

In Storing and Transporting

1. Check if properly identified and if new production batches are segregated from previous batches
2. Check if during storage and transport, product is not exposed to any of the following
 - direct sunlight or near source of strong sunlight
 - high temperature and humidity
 - contamination with moisture
 - contamination with dust or filth from the environment

In Record keeping /Reporting

1. Check production record; daily control chart, weekly summaries of activities, and corrective actions maintained for a period of at least 12 months from the date of manufacture. Manufacturers shall provide traders with a Certificate of Quality of the specified batch or lot sold to the repackers or traders.
2. Check quality control record.
3. Check marketing and distribution record.

Safety Measures to Be Observed in Implementing Sanitary Food Handling Practices



Good Manufacturing Practices (GMP) is a broad term and includes accepted standards in the safety and maintenance of the following.

- **Production And Process Control Safety**

1. All operations involving receiving, inspecting, preparing, processing, packaging and storing of food must be conducted under such conditions that they do not contribute contamination in the form of filth, harmful chemicals, undesirable microorganisms or any other objectionable material to the finished product.
2. A strict quality control of raw materials should be enforced. Low grade raw materials or those that fail to meet specifications should be rejected because this would only result in an inferior finished product.
3. Containers and carrier of raw materials, packaging materials, storage and transportation of finished products should be thoroughly inspected and monitored.

- **Worker's Hygiene and Safety**

1. Good working conditions ensure not only the safety of workers but also safety of food products that reach the consumers. Food processing plant personnel must be adequately trained on the proper hygiene and accident prevention that must be observed or practiced in the plant to assure continuous flow of work. These minimize the chance of contamination and accidents that cause unwanted delays.
2. Workers infected with contagious diseases should not be allowed to work as they can be sources of contamination. They should be quarantined until cured and safe from spreading the disease. Food handlers with open and infected wounds or sores in the hands or arms should not be allowed to handle food products directly for they can contaminate the food they touch. They should always be made aware of the dangers of haphazard or careless practices. Strict compliance to sanitary measures should be observed.

- **Safety measures to be observed by food handlers:**

1. The hands should be washed thoroughly with soap and water. A disinfecting solution of chlorinated water should be available for rinsing the hands before handling food. Wearing rings, bracelets, and wrist watches during processing should be avoided as these can be sources of contamination.
2. Smoking in the preparation, processing, and packing area should never be allowed. Smoke can be absorbed in the food or the ashes and cigarette butts may get into the food. Spitting and blowing of nose should never be done within the premises of the plant. These unhealthy habits contribute to contamination and spread of diseases.
3. Food handlers should be properly dressed. The use of gowns, aprons, head caps or hair nets, masks, rubber gloves and boots is ideal. This prevents contamination of the food by foreign matters from the handler's body like hair, dust, and germs exhaled from the nose and mouth. However, for small scale industries, clean and light colored shirts and caps or hairnets would be sufficient.
4. Whenever possible, food must not be handled by bare hands during preparation and packing.
5. Packaging materials must never be handled directly particularly on the side that shall be in direct contact with the food.

- **Equipment and Facilities Safety**

1. Processing facilities should be well ventilated, adequately lighted and properly maintained. Thorough washing and subsequent disinfecting of processing equipment before and after use should be a standard operating procedure (SOP).

A good processing plant should have an effective pest control to keep it free from rodents and insect pests. Cleanliness of processing equipment, utensils and surroundings prevents both infestation and contamination.

2. Potable water supply should be available from adequate sources. Good drainage and sewage disposal system should also be provided. These are essential for the efficient maintenance of sanitation.
3. Waste disposal should be properly managed to prevent pollution of surroundings.



How Much Have You Learned?

Self-Check 2.1

Directions: Fill in each blank with a word or words to make the statement complete.

1. _____ are components of GMP emphasizing sanitation procedures designed for the promotion and maintenance of health and cleanliness in a processing plant.
2. _____ is the process of putting/attaching labels on the immediate container.
3. _____ is a primary concern of all food processing firms to prevent or minimize hazards of product contamination and conditions aesthetically offensive to the consumers.
4. _____ refers to the practices and procedures implemented in processing plants to ensure product safety, product quality and prevention of economic fraud.
5. _____ is any printed pictorial or material attached to any container.
6. _____ are situations that ensure safety of workers as well as food products that reach the consumers.
7. _____ is a disinfecting solution available for rinsing hands before handling food.
8. _____ are protective coverings worn by food handlers to prevent contamination of the food from foreign materials.
9. _____ refers to clean water that is safe for drinking and cleaning.
10. _____ is a mixture of salt and water.

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 3

Conduct work in accordance with environment policies and procedures

PERFORMANCE STANDARDS

1. Food safety hazards must have and implemented HACCP plan.
2. Monitoring procedures are strictly followed.
3. Record keeping systems to document monitoring and corrective actions are developed.



What Do You Already Know?

Let us determine how much you already know about conducting work in accordance with environment policies and procedures. Take this test.

Pretest LO 3

Directions: Choose the letter of the correct answer.

1. Which of the following is the legal basis of waste management?
 - A. R.A.9003
 - B. R.A 9155
 - C. R.A. 9503
 - D. R.A. 8550
2. Which method of treating liquid waste control is employed as a preliminary treatment for the removal of large solid particles prior to final treatment or discharge into a municipal sewage system?
 - A. Screening
 - B. Lagooning- biological disposal
 - C. Spray – irrigation – land disposal
 - D. Chemical treatment
3. Biological action, sedimentation, soil absorption, evaporation, and dilution are the principles of:
 - A. Screening
 - B. Lagooning- biological disposal
 - C. Spray – irrigation – land disposal
 - D. Chemical treatment
4. Which of these types of lagoon is used in disposing industrial wastes which meets the requirements of industries discharging small daily volume of wastes on a seasonal operation?
 - A. Impounding lagoon
 - B. Flow – through lagoon
 - C. Aerated lagoon
 - D. Anaerobic lagoon
5. Which of these is not included in housekeeping system?
 - A. Waste minimization such as reduce, reuse, recycle
 - B. Energy conservation
 - C. Productivity improvement schemes
 - D. Control of pest
6. Hazard Analysis Critical Control Point (HACCP) involves the following prerequisite programs except:
 - A. Good Manufacturing Practices
 - B. Sanitation Standard Operating Procedures

- C. Good Housekeeping Systems
 - D. Quality assurance and inspection
7. HACCP means
- A. Hazard Applicable Control Critical Point
 - B. Hazard Analysis Critical Control Point
 - C. Hazard Approach Critical Control Point
 - D. Hazard Acceptable Critical Control Point
8. Which of the following does not belong to the group of HACCP concepts?
- A. sanitation control of the potential hazards
 - B. a preventive system of control particularly on biological hazards
 - C. a system approach for estimating the risk in producing a food product.
 - D. universally recognized system as the most effective way to prevent food borne illness.
9. Which of the following does not belong to HACCP methodology?
- A. HACCP Concepts
 - B. HACCP prerequisite program
 - C. HACCP principles
 - D. HACCP preliminary steps
10. Which of these does not belong to HACCP characteristics?
- A. The manufacturing process does not contain a control processing step that effectively destroy harmful bacteria.
 - B. No terminal heat process is done after packaging.
 - C. The product is not subject to contamination after processing and before packaging.
 - D. The product contain sensitive ingredients which can be assumed as potential sources of contamination under normal circumstances.



What Do You Need To Know?

Read the Information Sheet 3.1 very well then find out how much you can remember and how much you learned by doing Self-check 3.1.

Information Sheet 3.1

LO3. CONDUCT WORK IN ACCORDANCE WITH ENVIRONMENTAL POLICIES AND PROCEDURES

The maintenance of cleanliness in a working area requires frequent or continuous cleaning as well as a clean up at the end of each day. The purpose of this is to keep waste from accumulating during the operating day. It involves careful organization, training work scheduling, and the best available equipment, method, and materials.

Hazard Analysis Critical Control Point (HACCP)

HACCP allows processors/regulator to look at what happens during the process to ensure safety.

Major Concepts of HACCP

1. A preventive system of control particularly on biological hazards
2. A system approach for estimating the risk in producing a food product
3. Universally recognized system as the most effective way to prevent food borne illness
4. Science - based systematic, identified specific hazards and measures for their control to ensure food safety
5. Capable of accommodating change, such as advances in equipment design, processing procedures, or technological developments that can be applied throughout the food chain from the primary producer to the final consumer
6. Applicable to establishments that produce, process, treat, pack, trade, transport, serve, or involve in food production

Seven (7) HACCP Principles

1. Hazard analysis
2. Identify critical control points
3. Establish Control limits
4. Monitor critical limits
5. Establish corrective actions in case of deviation from established critical limits
6. Establish verification procedure to ensure that the system is consistent
7. Establish record keeping procedures

General Hazards Characteristics

1. The product contains sensitive ingredients, which can be assumed as potential sources of contamination under normal circumstances.
2. The manufacturing process does not contain controlled processing steps that effectively destroy harmful bacteria.
3. There is substantial potential for microbiological abuse in distribution or in consumer handling that could render the product harmful when consumed.
4. Product is subject to contamination after processing and before packaging.
5. No terminal heat process after packaging.

Hazard Categories

Category	Descriptions
I	A special category of non-sterile products designed and intended for consumption by infants, aged, and the sick
II	Food products subject to first 3 general hazard characteristics
III	Food products subject to 2 of any general hazard characteristics

IV	Food products subject to 1 general hazard characteristics
V	Food products subject to none of the general hazard characteristics

Critical Control Points (CCP) for Fresh or Frozen Fishery Products

Input Materials	Hazard	CCP
a. Fish, Mollusk, Crustaceans	Decomposition Unwholesomeness	Prior to Processing
b. Others	Not food grade Ingredients Unclean Adulterated Misapplication	Prior to use Unsuitable
c. Packaging Materials	Not approved for food contact, unclean, unsound	Prior to use Packaging area
d. Labels	Information not consistent with regular requirement	Prior to use
e. Cleaning	Not approved for agents, sanitizers, lubricant surfaces Misapplication	Prior to use Use in food plants or on food on contact Application area
Production condition		
a. Operation and Sanitation	Non - compliance with regulation	Prior to or during processing
b. Process control	Non - compliance with regulation	During processing
c. Storage	Non - compliance with regulation	During storage

HACCP Pre-Requisite Programs

1. Good Manufacturing Practices (GMP)

This provides the sanitary infrastructure for Food Safety that the:

- a. Plant grounds and building facilities emphasize pest control;
- b. Equipment design provides ease in cleaning and maintenance;
- c. Personal hygiene practices and facilities are set;
- d. Process controls are followed;
- e. Storage and warehousing are free from contamination.

2. Sanitation Standard Operating Procedures (SSOP)

SSOP are components of GMP that emphasize sanitation procedure. They include:

- a. Safety of water that gets in contact with food and food surfaces;
- b. Condition and cleanliness of food contact surfaces;
- c. Measures to prevent contamination;
- d. Employee hygiene practices;
- e. Control of employee health conditions that could result in contamination of food and food surfaces;
- f. Protection of food and food contact surfaces from adulteration with toxic and other harmful components;
- g. Proper labeling and storage and use of toxic; and
- h. Control of pests.

3. Good Housekeeping System

- a. Waste minimization such as reduce, reuse, recycle
- b. Energy conservation
- c. Productivity improvement schemes

Food Processing Plant Facilities and Environment

1. Building

- a. Walls. There should be no double walls that could harbor rodents and insects.
- b. Screens. The openings such as windows and doors should be properly screened to prevent insects and birds from entering into the laboratory rooms.
- c. Ceilings, walls and floors. These should be smooth and washable, with a minimum of ledges, beams, and areas where dust and debris could accumulate. Floors should be in good repair, well drained, and easily cleaned.
- d. Ventilation. There must be enough ventilation to prevent condensation. Condensate forming on overhead pipes and beams may drip into products and containers and deteriorate structures.
- e. Paint. It should stand up under the conditions of use expected because flaking and peeling of paint on walls and ceiling above food handling areas is a source of contamination.

2. Plant Lighting

- a. Light should be even and without glare, strong reflections or deep shadows, and of proper color rendition.
- b. Light bulbs and tubes should be of the safe type to prevent contamination by broken glass and to protect workers

3. Water Supply.
 - a. Private wells and surface supplies must be protected against surface and underground contamination.
 - b. There must be regular bacteriological and periodic chemical examinations made.
 - c. Well casings must be sealed.
 - d. Cross-examination of potable and non-potable water distribution should be examined.

4. Drainage
 - a. Gutters should be accessible for cleaning.
 - b. Water flow should be adequate to remove wastes and round bottoms are easier to clean
 - c. Floor should be smooth and sloped between 1/8 to 3/8 inch per foot to prevent standing waste and water.
 - d. Water should not run across floors where employees walk.

5. Disposal of Solid wastes
 - a. Solid wastes must be removed from the premises at frequent intervals to prevent safety hazards, to avoid odors of fermentation and decay and to prevent insect attraction.
 - b. Water containers must be properly cleaned, and containers that absorb juices should not be used.
 - c. Final disposal must be an area or manner to prevent nuisance and insect breeding.

6. Drinking Fountain
 - a. There must be one drinking fountain for every 50 employees.
 - b. The water temperature must range from 45°- 50°F is desirable.
 - c. It should be conveniently located but not within toilet rooms or over hand washing sinks.

7. Toilets
 - a. Water flushed toilet is preferable and should be set free from all enclosing wood.
 - b. The number of toilets depends on the number of employees.

No. of Employees	No. of Toilets
1 - 9	1
10 - 20	2
21 - 30	3
31 - 40	4
41 - 50	5
51 - 60	6
61 - 70	7

71 - 100	8
Over 100	1 for every 20

8. Washing Facilities

- a. It should be placed near the toilets and in the washing area.
- b. Soap, individual towels or paper napkins suitable for drying devices should be available.

9. Employee Sanitation

- a. Employees' personal hygiene such as proper clothing, head covering, gloves, and boots should be checked properly.
- b. Wearing jewelries and keeping objects in breast pockets should be avoided.
- c. Spitting of employees on the floors and walls as well as smoking are strictly prohibited.

10. Clean up Procedures:

The general information regarding plant clean up for proper evaluation is as follows:

- a. How much time has elapsed since last clean up?
- b. Is a separate clean up group used?
- c. Do workers do clean up?
- d. Is there a clean up supervisor?
- e. Are there clean up specifications such as methods, materials, equipment, and time?
- f. What clean up equipment, detergents, and sanitizing agents are used?
- g. When, where, and how are clean up procedures are implemented?

Waste Management

1. 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.
2. 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 is 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. Lagooning – Biological Disposal. It consist of holding the wastes effluent in open earthen pits which accomplish treatment under five principles namely:

- a. Biological Action (aerobic and anaerobic)
- b. Sedimentation
- c. Soil absorption
- d. Evaporation
- e. 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.
3. 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:
 - a. Quantity of effluent for disposal (per hour, per day, per week, per season)
 - b. 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
 - c. Character effluent
 - d. Climate during operational season.
4. Chemical Treatment. Chemical precipitation is a form of partial treatment with the use of chemical coagulants of lime followed by ferrous sulfate 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.

BFAR Regulations on Fishery Processed Products

Fish Inspection and Quality Control Section

Regulation and Requirements

- I. BFAR Guidelines on plant accreditation/approval:
 - ▶ The accreditation process commences with the application through submission of LTO, GMP, SSOP and HACCP plan specific to the product, processing activity and plant location
 - ▶ Accreditation is based on verified compliance with the submitted programs and established rules and regulations on product safety and quality.
 - ▶ BFAR conducts both announced and unannounced inspections

- ▶ BFAR provides a certificate of accreditation and a certificate of HACCP implementation to plants that have satisfactorily met the requirements
- ▶ Validity of accreditation varies from 6 months (plant rating of AB or BA) to 1 year (plant rating of AA)
- ▶ BFAR notifies plants of any non-compliance deficiencies after each inspection
- ▶ Accreditation is given only to plants obtaining a plant rating of AB / BA or AA on I. plant structure and equipment requirements and II. GMP/SSOP and HACCP implementation
- ▶ BFAR shall withdraw the accreditation for plants with critical deficiencies.
- ▶ Delisted plants may apply for re-accreditation after corrective actions have been effectively instituted on deficiencies that have caused the withdrawal of accreditation.

The Provisions of the Regulations the Seafood HACCP Regulations

1. Coverage:

a. all "processors"

- ▶ All seafood-related entities in our establishment inventory. All foreign processors that export to the U.S.

Exempt:

- ▶ Fishing vessels
- ▶ Common carriers
- ▶ Retail

b. All importers

2. Hazard analysis (HACCP Principle #1)

- a. Every "processor" must conduct a hazard analysis to determine whether they have likely food safety hazards that they must control.

If no:

they do not need a HACCP Plan for the time being (assuming they're right). they must reassess, however, whenever a significant change occurs.

If yes:

they must have and implement a HACCP Plan.

3. The HACCP plan

a. Where hazard analysis reveals need, every "processor" must have a written HACCP plan that's specified to location and kind of product.

b. HACCP plan must ID:

i. Food safety hazards that is reasonably likely to occur.

These include anything that causes food to be unsafe under the act. (Ex. toxins, micro, chemicals, pesticides, drug residues, physical hazards, decomposition

ii. Critical control points to control hazards that can occur both inside & outside the processing plant. (HACCP PRINCIPLE #2)

iii. Critical limits (i.e., safe operating parameters) for the CCP's. (HACCP PRINCIPLE #3)

iv. Monitoring procedures (HACCP PRINCIPLE #4)

v. Corrective action plans, if any. (HACCP PRINCIPLE #5)

vi. Verification procedures to: (HACCP PRINCIPLE #6)

vii. Recordkeeping system to document monitoring, corrective actions, certain verification procedures. (HACCP PRINCIPLE #7)

c. Signing/dating: Plan must be signed/dated by a senior firm official. This must occur initially, upon modification, and at least annually.

4. Corrective Actions

Processors may either...

a. Follow corrective action plans they have developed in advance, or

b. Do the following:

▶ Segregate and hold product while determining acceptability of product for distribution. (Must use person with adequate training or experience)

▶ Take necessary corrective action;

- ▶ Check the plan to see if it needs to be modified; modify as necessary (Must use trained individual).

5. Verification

- a. Verifying the HACCP plan: Processors must reassess adequacy of their HACCP plan at least annually or whenever a significant change occurs.
- b. Verifying ongoing activities:
 - i. Processors must follow written verification procedures that are in their HACCP plans for reviewing consumer complaints, calibrating their monitoring devices, engaging in any end-product testing.
 - ii. Processors must review monitoring and corrective action records within one week of the creation of the records, and must review calibration & end-product testing records within a reasonable time.
 - iii. Processors must check whether their consumer complaints that alleged safety problems reveal any problems with their HACCP systems that must be fixed.

6. Records

- a. Monitoring and similar records must state the name and location of the processor, date and time, signature/initials of person making the record.
- b. Records retention: processors must store records for 1 to 2 years, depending on type of record and type of product (i.e., shelf-life)
- c. Plans, HACCP records, and sanitation records, must be available to FDA inspectors for review and copying. Consumer complaints are not available, but the consumer complaint SOP is available
- d. All plans and records in possession of FDA are deemed to be not available for public disclosure per FOIA regulations. Exceptions: (1) previously disclosed or abandoned materials; (2) discretionary disclosure in accordance with FDA's FOIA regulations.

7. Training

- a. For each processor, certain enumerated HACCP functions must be performed by an individual who has been trained in HACCP through course materials or who, through job experience, has provided knowledge equivalent to a course. The course must be at least equivalent to a standard curriculum recognized as adequate by FDA.
- b. The enumerated functions are:
 - ▶ Developing the HACCP plan or adopting a generic-type HACCP plan to fit the specific needs of a processor.

- ▶ Reassessing/modifying the HACCP plan as a result of verification activities and any corrective actions that occur.
- ▶ Reviewing HACCP records for adequacy.

Processors have a choice: they may either obtain training for one or more of their own employees, or they may hire trained independent contractors to perform these functions.

8. Sanitation

- a. Monitoring and recordkeeping. Processors must monitor and keep records in eight (8) enumerated areas of sanitation. Processors may establish their own monitoring frequencies. This monitoring and recordkeeping may be part of the processor's HACCP system or in a parallel system outside of the HACCP plan. FDA has access to these records. The regulations recommend that processors have a sanitation SOP for the 8 enumerated areas, but it is not required.

9. Special Requirements for Imports

- a. Importers must verify that their overseas suppliers follow HACCP. there are two ways to verify:
 - i. Obtain product from a country with which the U.S. has a HACCP-based agreement on the equivalency of inspection programs. or
 - ii. Implement verification procedures:
 - ▶ product specifications for safety and
 - ▶ affirmative steps to ensure that HACCP is actually practiced. Any of the following:
 1. obtaining processor's HACCP records;
 - ▶ obtaining either continuing or lot-by-lot certificate from foreign government
 2. inspection authority or competent third party certifying product processed according to requirements;
 3. going overseas and inspecting facilities to ensure processing of product according to requirements;
 4. obtaining and keeping on file an English copy of processor's HACCP plan and a written guarantee that it is being followed;
 5. End-product testing and keeping on file an English copy of guarantee that plan is being followed.

10. Special Requirements for Mollusk Shellfish

- a. Controlling the origin of mollusk shellfish (i.e. properly classified waters) is most important preventive control for most hazards. Thus, the HACCP plans of processors of mollusk shellfish must include how this control is being performed, including how processors are only obtaining shellfish:
- ▶ From water approved by a "shellfish control authority",
 - ▶ From harvesters who are in compliance with local licensure requirements.
 - ▶ If properly "tagged".

11. Special Requirements for Smoked Fish

- a. Botulism is a significant likely hazard for this type of product if not sufficiently controlled. Thus, the HACCP plans of processors of smoked fish must include how they are controlling this hazard to ensure zero toxin production in the product for a time slightly beyond the shelf life of the product.

12. Time Frame for the Implementation

- a. The industry has two years to obtain training, write HACCP plans, install HACCP systems, engage in sanitation monitoring, etc. FDA is preparing to conduct voluntary, "dry run" HACCP inspections during this two year period. Full, mandatory implementation must occur by the end of this period.



How Much Have You Learned?

Self-Check 3.1

Write TRUE if the statement is correct and FALSE if the statement is wrong.

_____ 1. Hazards analysis is the identification of selective ingredients, critical process points, and relevant factors as the key to product safety.

_____ 2. The manufacturing process does not contain control processing in breast steps that effectively destroy bacteria.

_____ 3. A product can be subjected to contamination after processing and before packaging.

_____ 4. Walls should be doubled to prevent harboring rodents and insects.

_____ 5. Wearing of jewelries and keeping objects pockets by employees should be encouraged.

- _____ 6. Spitting of employees on the floors and walls as well as smoking are allowed.
- _____ 7. Washing facilities should be placed near the toilets and in the washing area.
- _____ 8. There must be regular bacteriological and periodical chemical examination of water supply.
- _____ 9. Chemical precipitation is a form of partial treatment with the use of chemical coagulants of lime followed by ferrous sulfate or alum.
- _____ 10. Spray irrigation serves as an expensive and objectionable waste disposal method when land is available.

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Operation Sheet 3.1

Ways of Disposing Liquid Waste

Procedure:

Group students and have them identify and demonstrate the different ways of disposing liquid waste.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Job Sheet

Ways of Disposing Liquid Waste

Did the student/s...	YES	NO	N/A
1. employ the proper techniques of treating waste before disposing?			
2. demonstrate/perform the proper ways of disposing liquid waste?			

Student's Name _____ Date _____

Comments/Suggestions:

LEARNING OUTCOME 4

Participate in improving environment practices at work

PERFORMANCE STANDARDS

1. Preparedness and mitigation activities.
2. Response activities during a chemical spill.
3. Rehabilitation activity after a chemical spill.



What Do You Already Know?

Let us determine how much you already know about participating in improving environment practices at work.. Take this test.

Pretest LO 4

Directions: Choose the letter of the correct answer.

1. Which of the following environmental hazards refers to a sudden rise, usually brief, in the water level of a stream to a peak from which the water level recedes at a slower rate?
 - A. fire
 - B. flood
 - C. chemical spill
 - D. None of these
2. What is referred to as a rapid oxidation with evolution of light and heat?
 - A. flood
 - B. chemical spill
 - C. Fire
 - D. All of these
3. What environmental hazard is caused by contamination of food with biological and chemical contaminants?
 - A. chemical spill
 - B. fire
 - C. Flood
 - D. Food poisoning
4. Which of the following hazards usually happens during laboratory work wherein students come in contact with poisonous/dangerous chemicals?
 - A. chemical spill
 - B. electrical blackout
 - C. Food poisoning
 - D. Pollution
5. Which of the following environmental hazards refers to the discoloration of bodies of water due to the presence of an extremely enormous amount of “bloom” of a group called dinoflagellates which are toxic?
 - A. pollution
 - B. fire
 - C. Flood
 - D. Red tide
6. What should be done as a response during pollution?
 - A. clean up coastal areas

- B. boil water for consumption
- C. provide warning signs or posters in affected areas
- D. all of the above

7. What mitigation or preparedness should be made in case of power interruption?

- A. Hang the flashlight
- B. Have ready a gas lamp or a candle
- C. Both A and B
- D. None of these

8. Which of the following response should be done during chemical spills?

- A. vacate the room
- B. avoid throwing water or touching the chemicals with bare hands
- C. inform proper authorities
- D. all of these

9. What PD is the fire code of the Philippines containing salient provisions on death and injury to persons and loss damage to property?

- A. PD 9003
- B. PD 8550
- C. PD 1185
- D. PD 9155

10. Which of the following refers to the release of a liquid petroleum hydrocarbon into the environment due to human activity?

- A. spill
- B. flood
- C. debris
- D. pollution



What Do You Need To Know?

Read the Information Sheet 4.1 very well then find out how much you can remember and how much you learned by doing Self-check 4.1.

Information Sheet 4.1

LO4. PARTICIPATE IN IMPROVING ENVIRONMENTAL PRACTICES AT WORK

The Environmental Hazards

Floods

Flood is defined as a rise, usually brief, in the water level in a stream to a peak from which the water level recedes at a slower rate.

Safety Precautions Before the Flood

1. Ensure that you understand the dangers of flood properly.
2. Know the flood history of your area.
3. Make a mental note of the nearest high ground to your place.
4. Understand the warning message, the impacts of major, moderate or minor flooding to your area and which areas are vulnerable to the different degrees of flooding.
5. In times of bad weather, always listen to official warnings issued by local authorities.
6. Prepare a flood emergency kit.
7. Prepare and discuss with other members of the community, the details of a local hazard map.
8. Indicate the flood path and the sequences of flooding in the area.
9. Evacuation plans should be made in advance. Each member of the family must be given specific role and responsibility in case of evacuation.
10. If your community has boats, make sure they are well maintained and properly tied up to a tree or other permanent object. Emergency workers may assist people in flooded areas. You may be able to help them.
11. Try to avoid walking through the flooded area. Flooding may have caused familiar places to change since flood waters often erode roads and walkways. Flood debris may hide animals and broken bottles and sharp steel ends.

12. If you must walk through a flooded area, stay on firm ground. Standing water may be electrically charged from underground or downed power lines. Check them.
13. Do not touch any damp electrical sockets or turn on the electricity if the house had been flooded until it has been checked and dried up for some time.



What to Do After the Flood?

1. Inform your neighbors that you are returning home and obtain advice before making a decision.
2. Roads may still be closed because they have been damaged or are still covered by water. If you happen to come across such road with stop signs please avoid these roads and find another way.
3. Keep listening to the radio for news. Additional flooding or flash flood may occur.

Returning to Normal Life After the Flood

Floods can cause emotional and physical stress. You need to look after yourselves and your family during the transition period. It may take some time to get a house back into its original condition. There are ways that can help you and your family return to normal life.

1. Before entering the house, get advice from skilled persons about the supply of electricity, water, gas, and others. Get their advice on the necessary repairs and do not enter the house if you cannot get any advice.
2. Rest and eat well before starting clean up operations. Make sure that there is no more threat of the occurrence of flash flood.

FIRE

Fire is frequently referred to as rapid oxidation with the evolution of light and heat. It is the result of chemical combination of materials (fuel) with oxygen in the presence of enough heat.

Classes of Fire

Class A. It is a freely burning fire in ordinary combustible materials such as wood, cloth, paper, and others.

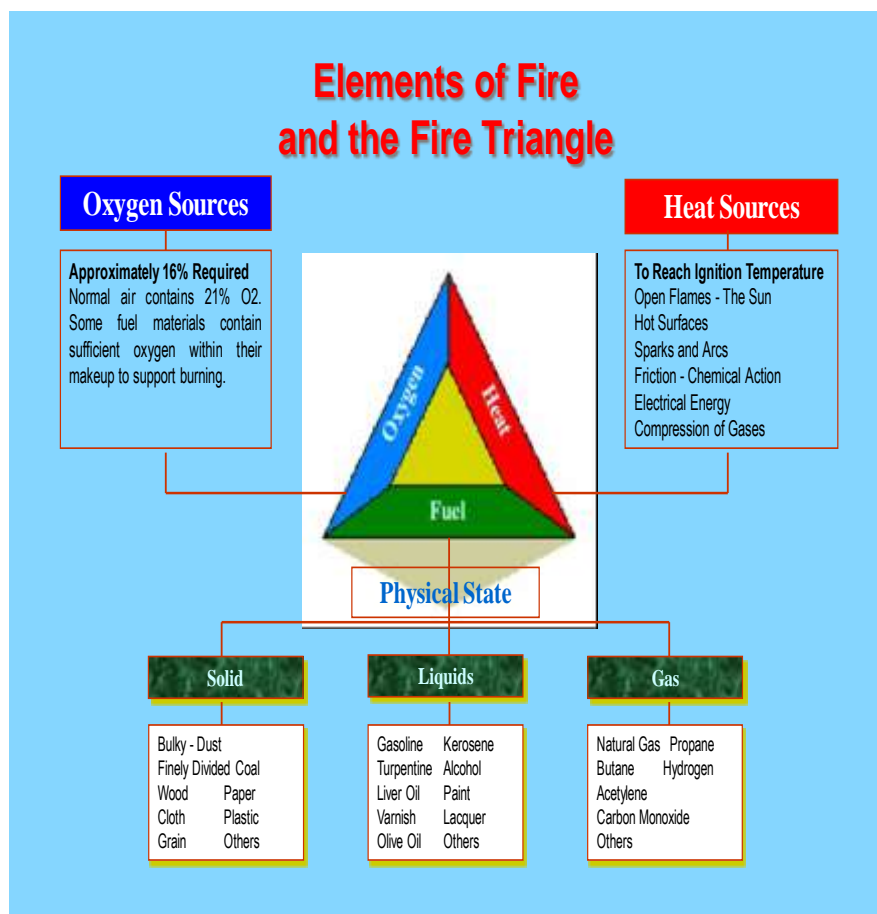
Class B. It is caused by a flammable liquid such as oils, spirits and petroleum products.

Class C. The fire involves energized electrical equipment

Class D. This is a metal fire (Magnesium, Titanium)

Class E. This is a nuclear fire.

Class K. This is a kitchen fire.



FIRE: An Unpredictable Hazard and Disaster

What is PD 1185?

PD 1185 is the fire code of the Philippines containing these salient provisions;

WHEREAS, death and injury to persons and loss damage to property by fire have reached alarming proportion that the economic and social gains of the society are being continually undermined;

WHEREAS, in order to effect a meaningful reduction of the alarming fire losses, there is a need to develop national consciousness and involvement of all persons in the prevention and suppression of fires;

WHEREAS, fire prevention and suppression require the adoption of uniform fire safety standards, the incorporation of fire safety construction and provision of protective and safety devices in buildings and structures;

WHEREAS, there is an urgent need for an agency primarily responsible for the implementation and coordination of the activities of all sectors of society on fire safety, prevention and suppression;

WHEREAS, in order to effectively implement all efforts to minimize the occurrences of fires and their destructive effects, full financial, equipment and personnel support by the government and the private sector is necessary;

Heat and Radiation

Heat generates thermal energy and may travel in any direction that will affect clusters of houses.



Fire, Heat and Smoke

Extinguishing this kind of fire is usually misunderstood when firefighters dose off water on the unburned houses.



Phases of Fire

Enclosed Area

- 1. Incipient**
- 2. Free Burning**
- 3. Smoldering**

Open Area

- 1. Incipient**
- 2. Smoke Stage**
- 3. Flame Stage**
- 4. Heat Stage**

CHEMICAL SPILL (Hazard of Laboratory Work)

One of the hazards of laboratory work is chemical spill. It becomes hazardous when students come in contact with poisonous or dangerous chemicals.

Preparedness and Mitigation

1. Take precaution when handling chemicals.
2. Educate students on proper handling of chemicals.
3. Keep safe storage of chemicals.
4. Dispose chemicals properly.
5. Use gloves and mask when handling chemicals.
6. Close drawers of storage cabinet.
7. Maintain a stable environment.
8. Strengthen laboratory capabilities.
9. Provide fire extinguishers.

Response (What to do during chemical spills)

1. Vacate the room.
2. Avoid throwing water or touching the chemicals with bare hands.
3. Inform proper authorities.
4. Cover nose with wet cloth then transfer casualty to a safer place.
5. Give milk and starch for ingested chemical.
6. Ensure adequate air circulation around the victim.

Rehabilitation Phase after Chemical Spill

Call 117 Or local counterparts for paramedic

Electrical Blackout

It is an interruption of normal source of electrical power.

Preparedness and Mitigation

1. Hang the flash light.
2. Prepare ready a gas lamp or a candle.

Response (What to do during electrical blackout?)

1. Unplug all electrical appliances.
2. Stay put in one place to avoid accidents.

Rehabilitation Phase

1. Check electrical outlets and switches.
2. Avoid electric wiring hanging near trees.

Food Poisoning

It is a contamination of food with biological contaminants such as bacteria, fungi, viruses, and parasites. Chemical contaminants can take the form of agricultural chemicals (pesticides, insecticides, herbicides, fungicides; environmental pollutants (mercury, lead), veterinary products (antibiotics, growth enhancers), and additives (food additives, food coloring).

Preparedness and Mitigation

1. Discourage children's patronage of processed food.
2. Wash raw food thoroughly.
3. Cook food properly.
4. Eat cooked food immediately.
5. Store cooked food properly.
6. Avoid contact between raw and cooked food.
7. Wash your hands as often as possible.
8. Keep all kitchen surfaces meticulously clean.
9. Protect food from insects, rodents, and other animals.
10. Ensure that the school clinic is operational.
11. Ensure that policies related to canteen operation be strictly enforced.
12. Store dangerous chemicals out of children's reach.

Response (What to do during food poisoning?)

1. Do not panic.
2. Increase fluid intake to prevent dehydration, but if not tolerated orally, may be brought to the hospital for intravenous fluid treatment.
3. Induce vomiting.
4. Seek medical assistance in case of complication that may result to hepatitis, typhoid fever, diarrhea, cholera, dysentery, amoebiasis, etc.

Rehabilitation Phase

1. Encourage regular vendors selling outside the school to observe proper food handling and preparation
2. Authorize guards to station outside the school to check and remind street vendors to cover prepared food.
3. Require the students to bring their own eating utensils such as plates, spoon and forks, and glasses when they buy street food.
4. Have regular checking by authorized sanitary inspectors of the facilities and food handlers in the school canteen.

Environmental Hazards

Red Tide



It refers to the discoloration of water bodies due to the presence of an extremely enormous amount of “bloom” of a group called dinoflagellates which are toxic and responsible for paralytic shellfish poisoning (PSP).

Preparedness and Mitigation

1. Disseminate red tide information, symptoms, and progression.
2. Keep track of media information regarding Red tide.
3. Avoid ingestion of fish, shellfish, mollusks, crabs.

Response (What to do during red tide)

1. Monitor progression of symptoms and seek medical advice.
2. Avoid or refrain from eating seafood.

Rehabilitation Phase

Seek medical assistance.

Pollution



This is caused by the pollutants thrown into the ocean like seaweeds, marine litter, spills, fertilizers, pesticides from irrigation, and others.

Preparedness and Mitigation

1. Educate people on the proper disposal of waste.
2. Initiate mass cleaning of seashore.
3. Implement marine environmental law.

Response (What to do during pollution)

1. Clean up coastal areas.
2. Boil water for consumption.
3. Provide warning signs or posters in affected areas.

Rehabilitation Phase

Seek medical assistance for water-borne casualty.



How Much Have You Learned?

Self-Check 4.1

Directions: Write True, if the statement is correct and False, if the statement is wrong.

- _____ 1. Washing raw food thoroughly and cooking it properly is one of the mitigations in case of food poisoning.
- _____ 2. Pesticides, insecticide, herbicides, and fungicides are examples of chemical pollutants which cause food poisoning.
- _____ 3. Connection of all electrical and office appliances should be done as a response during an electrical brown-out.
- _____ 4. Milk and starch are examples of chemical spills that are hazardous and dangerous.
- _____ 5. Environmental hazards include flood, chemical spill, fire, pollution, brown-out, red tide, and food poisoning.
- _____ 6. There must be a provision of necessary tools like emergency kit in case of flood and other emergencies.
- _____ 7. Fire is not only hazardous to health but also a threat to economy.
- _____ 8. Flood is the result of chemical combination of materials (fuel) with oxygen in the presence of enough heat.
- _____ 9. Keep your emergency kit wet and dangerous.
- _____ 10. Just go near river banks or where there are signs of landslide or to areas where people have vacated.

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 4.1

Conduct a drill on what to do in case of an accidental chemical spill in a food processing plant

Procedure:

1. Vacate the room
2. Avoid throwing water or touching the chemicals with bare hands.
3. Inform proper authorities.
4. Cover nose with wet cloth then transfer casualty for safer place.
5. Give milk and starch for ingested chemical
6. Ensure adequate air circulation around the victim
7. Call 117 or local counterpart for paramedic.



How Well Did You Perform?

Find out by accomplishing the Performance Criteria Checklist honestly and sincerely. Remember it is your learning at stake!

Performance Criteria Checklist for

Activity Sheet

Conduct A Drill On What To Do In An Accidental Chemical Spill In A Food Processing Plant

Did the student...	YES	NO	N/A
1. wear appropriate protective outfit/gadget in doing preparedness and mitigation ?			
2. prepared tools, materials, equipment and other gadget in response to chemical spills?			
3. demonstrate the proper techniques and safety measures while working ?			

Student's Name _____ Date _____

Comments/Suggestions:



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

REFERENCES

- LO1
 - CBLM – Fish Processing II, pp. 14, 16 – 19
- LO 2
 - CBLM – Fish Processing IV, pp. 13 – 16
- LO 3
 - CBLM (Fish Processing), pp. 28 – 32
- LO 4
 - CBLM (Fish Processing IV), pp. 4 – 14

Answer Key

LESSON 1. Use food processing tools, equipment and utensils

LO1. Select tools, equipment and utensils

Pretest LO1

1. A
2. A
3. B
4. D
5. A
6. A
7. B
8. A

Self-check 1.1

1. Salinometer
2. Refractometer
3. Calibrate
4. Chlorine
5. Cylinder
6. Measuring cup for liquid ingredients
7. Distilled water
8. Thermometer
9. Weighing scale
10. One
11. Knives
12. Scissors
13. Tong
14. Chopping board
15. Earthen pots

LO2. Use tools, equipment and instruments following standard procedures

Pretest LO2

1. d
2. a
3. c
4. c
5. d

Self-check 2.1

1. d
2. d
3. b
4. d
5. a
6. c
7. b
8. d
9. d
10. d

Self-check 2.2

1. Conformity

	<ol style="list-style-type: none"> 2. Device 3. Graduation 4. Workplace 5. Brine 6. Catalogue 7. Equipment 8. Instrument 9. Brochure 10. Standard <p>Self-check 2.3</p> <ol style="list-style-type: none"> 1. d 2. c 3. b 4. a 5. c 6. c 7. b 8. a 9. b 10. d
LO3. Perform post-operation activities	
<p>Pretest LO3</p> <ol style="list-style-type: none"> 1. d 2. d 3. d 4. d 5. c 	<p>Self -check 3.1</p> <ol style="list-style-type: none"> 1. Check 2. Breakdown 3. Crack 4. Electrocutation 5. Inspect 6. Lubricant 7. Preventive Maintenance 8. Repairs 9. Switch 10. Switch – off

LESSON 2. Perform Mathematical Computations

LO1. Gather and tabulate the recorded data relevant to processed food production.	
<p>Pre-test LO1</p> <ol style="list-style-type: none"> 1.b 2.d 	<p>Self-check 1.1</p> <ol style="list-style-type: none"> 1. 4 2. $\frac{3}{4}$

3.b	3. 454
4.a	4. $\frac{1}{2}$
5.b	5. 32
	6. 3
	7. 16
	8. $\frac{1}{8}$
	9. 2500
	10. 38.94
LO2.Review various formulations	
Pretest LO2 1. b 2. a 3. c 4. a 5. b	Self-check 2.1 1. Concentration of a solution 2. Cost 3. Raw food cost 4. Production cost 5. Semi permeable membrane 6. Solution 7. Homogenous 8. 20 % - 60% 9. Brine 10. Dissolution
LO3.Calculate the production input and output.	
Pre-test 1.a 2.a 3.a 4.a 5.a	Self-check 3.1 1. Yield 2. 1:1 and 1: $\frac{3}{4}$ 3. 1:4 4. 250 grams 5. 1:3
LO4.Compute the costs of production.	
Pre-test LO4 1. c 2. c 3. c 4. c 5. b	Self-check 4.1 1. b 2. e 3. a 4. c 5. d

LESSON 3. Interpret Plans and Drawings

LO1. Interpret lay-out plan.	
Pre-test LO4 1. D 2. A 3. A 4. B 5. B	Self-check 4.1 1. Preparation 2. Sterilizing 3. Receiving 4. Labeling 5. Storing 6. Layout 7. Specification 8. Labeling 9. Label 10. Vacuum packaging
LO2. Perform outer packaging procedures.	
Pretest LO2 1. D 2. B 3. C 4. A 5. C	Self-check 2.1 1. B 2. D 3. B 4. A 5. D 6. C 7. D 8. A 9. D 10. C

LESSON 4. Apply Hygiene and Sanitation

LO1. Observe personal hygiene and good grooming	
Pretest LO1 1. B 2. C 3. D 4. D 5. A	Self-check 1.1 1. True 2. True 3. False 4. False 5. False 6. True

	<ul style="list-style-type: none"> 7. True 8. True 9. False 10. False
LO. 2 Implement food safety practices	
Pretest LO2. <ul style="list-style-type: none"> 1. D 2. D 3. A 4. D 5. A 6. C 7. C 8. D 	Self-check 2.1 <ul style="list-style-type: none"> 1. SSOP 2. Labeling 3. Sanitation 4. GMP 5. Label 6. Good working conditions 7. Chlorinated water 8. PPE 9. Potable water 10. Brine solution
LO3. Conduct work in accordance with environmental policies and procedures	
Pretest LO3 <ul style="list-style-type: none"> 1. A 2. A 3. B 4. A 5. B 6. D 7. B 8. A 9. A 10. C 	Self-check 3.1 <ul style="list-style-type: none"> 1. True 2. True 3. True 4. False 5. False 6. False 7. True 8. True 9. True 10. False
LO4. Participate in improving environmental practices at work.	
Pretest LO4 <ul style="list-style-type: none"> 1. B 2. C 	Self-check 4.1 <ul style="list-style-type: none"> 1. True 2. True

3. D	3. False
4. A	4. False
5. D	5. True
6. D	6. True
7. C	7. True
8. D	8. False
9. C	9. False
10. A	10. False

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