



RQF LEVEL 5



FOPVS503
FOOD PROCESSING

Vinegar and Spirit Production

TRAINER MANUAL

October, 2024



VINEGAR AND SPIRIT PRODUCTION

KOICA
Korea International
Cooperation Agency

TQUM
TVET Quality Management Project

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ACRONYMS

%: Percentage

°C: Celsius

°F: Fahrenheit

ABV: Alcohol by volume

CA: Controlled Atmosphere

CAS: Controlled Atmosphere storage

CIP: Cleaning in place

CO₂: Carbon dioxide

COP: Cleaning out of place

EI: Electron Ionization

ESI: Electrospray Ionization

FDA: Food and Drug Administration

FID: Flame Ionization

FIFO: First In, First Out

GC: Gas Chromatography

HCl: Hydrochloric Acid

HDPE: High-density polyethylene

HPLC: High-performance liquid chromatography

HTST: High temperature short time

Kg: Kilogram

L: Liter

LC: Liquid Chromatography

LTLT: Low temperature long time

ml: milliliter

MS: Mass Spectrometer

N: Nitrogen

NaOH: Sodium hydroxide

O₂: Oxygen

PET: Polyethylene terephthalate

PH: Potential of hydrogen

PPE: Personal Protective Equipment

RTB: Rwanda TVET Board

SOP: Standard Operating Procedure

TOF: Time of Flight

TQUM: TVET Quality Management Project

TVET: Technical and Vocational Education Training

UV: Ultraviolet

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled **"Vinegar and spirit production."** Trainees enrolled in this module will engage in practical activities designed to develop and enhance their competencies.

The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainer, you will begin by asking questions related to the activities to encourage critical thinking and guide trainees toward real-world applications in the labor market. The manual also outlines essential information such as learning hours, didactic materials, and suggested methodologies.

This manual outlines the procedures and methodologies for guiding trainers through various activities as detailed in their respective trainee manuals. The activities included in this training manual are designed to offer trainees opportunities for both individual and group work. Upon completing all activities, you will assist trainees in conducting a formative assessment known as the end learning outcome assessment. Ensure that trainees review the key reading and the points to remember section.

MODULE CODE AND TITLE: FOPVS503 VINEGAR AND SPIRIT PRODUCTION

Learning Outcome 1: Prepare Raw Materials and Ingredients

Learning Outcome 2: Conduct Alcoholic Fermentation

Learning Outcome 3: Make Vinegar

Learning Outcome 4: Make Spirit

Learning Outcome 1: Prepare Raw Materials and Ingredients



Indicative contents

1.1 Selecting Tools and Equipment for Producing Vinegar and Spirit

1.2 Selecting Cleaning Products Used in Vinegar and Spirit Production

1.3 Arranging the Workplace

1.4 Receiving Raw Materials Used in Vinegar and Spirit Production

1.5 Cleaning of Fruits

1.6 Storing Vinegar and Spirit Raw Material

Key Competencies for Learning Outcome 1: Prepare Raw Materials and Ingredients

Knowledge	Skills	Attitudes
• Description of tools and equipment used in vinegar and spirit making. • Description of cleaning agent required in vinegar and spirit production. • Description of raw materials and ingredients used in production of vinegar and spirit. • Description of storage condition for vinegar and spirit raw materials	• Selecting tools and equipment used in vinegar and spirit production. • Adjusting equipment used in vinegar and spirit. • Selecting cleaning agent for vinegar and spirit production • Preparing cleaning agent • Cleaning workplace, tools and equipment for vinegar and spirit. • Receiving raw materials and ingredients used in production of vinegar and spirit. • Cleaning fruits used in vinegar and spirits.	• Being specific in selecting tools and equipment for vinegar and spirit production • Being careful in adjusting equipment • Being precise in selecting cleaning agent • Being accurate while preparing cleaning agent. • Being accountable while cleaning workplace, tools and equipment. • Being honest while receiving raw materials for vinegar and spirit production. • Being careful while cleaning fruits used in vinegar and spirits.

	• Storing raw materials for vinegar and spirit	• Being responsible while storing raw material
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Duration: 10 hrs

Learning outcome 1 objectives:



By the end of the learning outcome, the trainees will be able to:

1. Describe clearly tools and equipment used in vinegar and spirit making based on their uses.
2. Select properly tools and equipment used in vinegar and spirit production according to intended uses.
3. Adjust properly equipment used in vinegar and spirit production according to their intended use and quality specification.
4. Describe accurately cleaning agent required in vinegar and spirit production based on sanitation guidelines.
5. Select properly cleaning agent for vinegar and spirit production according to food health and safety guidelines.
6. Clean effectively workplace, tools and equipment according to standard specification.
7. Describe properly raw materials and ingredients used in production for vinegar and spirit production according to standard specification.
8. Receive appropriately raw materials and ingredients used in production of vinegar and spirit according to their intended use and quality specification.
9. Clean efficiently fruits used in vinegar and spirits production based on quality specification.
10. Store properly raw materials for vinegar and spirit production according to the storage condition



Resources

Equipment	Tools	Materials
• Peeling machine • Pulping machine • Washing machine • Pasteurizer • Slicing machine	• Knives • Spoons • Refractometer • Thermometer • Jugs	• Banana • Passion fruits • Pineapple • Straw berry • Apples

• Cooling tank • Blender • PPE • Compressor • Cooker • Juice extracting machine. • Vacuum cleaner • Working table • Packaging machine • Fermentation tanks • Distillation columns • Distillation pot filling machine • Capping machine • Sealing machine • Labelling machine	• Analytical balances • Cutting • Boards • Brushes • Broom • Dustbin • Bucket • Dustbin • Brew barrels - brew bucket, • Squeegee • Mop • Graduated cylinder. • Alcoholmeters • Glassware • Vinometer • Methanol essay kit • Ph meter	• Sugar water • Preservatives • Disinfectants • Packaging materials • Labels • Starter cultures • Gas lighter • Filter cloths • Sponges • Towels
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Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail classroom and prepared workshop for vinegar and spirit production.
- Avail tools, material and equipment used in vinegar and spirit production.
- Prepare teaching aids and didactic material (videos, Audio visuals, manual/guide, protocols) for preparing raw material for vinegar and spirit production.



Indicative content 1.1: Selecting tools and equipment for producing vinegar and spirit



Duration: 1hrs



Theoretical Activity 1.1.1: Description of tools and equipment for vinegar and spirit production



Notes to the trainer:

- Trainer may use small groups for describing tools and equipment used in vinegar and spirit production.
- Trainer may use drawings, pictures, videos, audio visuals as didactic material for describing tools and equipment used in vinegar and spirit production.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- i. What do you understand by the following terms:
 - a) Vinegar
 - b) Spirit
- ii. What are tools and equipment used in vinegar and spirit production?
- iii. What are safety precautions of using tools and equipment?

Step 2: Ask trainees to write their findings on papers, flip chart, blackboard, or white board

Step 3: Engage trainees to present their findings.

Step 4: Provide the expert view and clarify ideas by using didactic materials.

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key readings 1.1.1 in trainee manual.



Points to Remember

- For easy and efficient vinegar and spirit production, you are recommended to use right tools and equipment. Respect safety precautions.



Practical Activity 1.1.2: Selecting and adjusting tools and equipment used in vinegar and spirit



Notes to the trainer

- The trainer may use individual based activity and demonstrate how to select and adjust tools and equipment used in vinegar and spirit production.
- Avail required tools and equipment for being selected and a protocol to be followed.



Key steps:

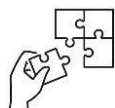
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go in the food processing workshop to select and adjust tools and equipment to be used in vinegar and spirit production.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how you can select and adjust tools and equipment and explain the selection criteria and adjustment procedures.
- Step 4:** Asks trainees to select and adjust tools and equipment used in vinegar and spirit production.
- Step 5:** Verify whether tools and equipment used in vinegar and spirit production are correctly selected and adjusted and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.1.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.1.



Points to Remember

- Selecting the right tools and equipment for vinegar and spirit production is crucial to ensure efficient and high-quality production. While selecting consider the selection criteria and follow steps for selection.
- Tools and equipment must be adjusted accordingly following adjustment procedure to ensure quality and quantity production.



Application of learning 1.1.

There is someone who need to establish a vinegar and spirit production industry near your school. Ask trainees to help him/her to select and adjust tools and equipment for vinegar and spirit production.

Checklist

SN	Criteria	Indicator	Score	
			Yes	No
1	Tools and Equipment are properly selected	1.1 Tools are selected		
		1.2 Equipment are selected		
		1.3 Equipment are adjusted		
2	Tools and Equipment are properly adjusted	2.1. Tools are adjusted		
		2.2. Equipment are adjusted		



Indicative content 1.2: Selecting cleaning products used in vinegar and spirit production



Duration : 1hrs



Theoretical Activity 1.2.1: Description of cleaning agent used in vinegar and spirit



Notes to the trainer:

- Trainer may use small groups for describing cleaning agent used in vinegar and spirit.
- Trainer may use pictures, videos, Audio visuals as didactic material for describing cleaning agent used in vinegar and spirit.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to answer the following questions:
- i. What do you understand by the terms cleaning agent?
 - ii. What are the types of cleaning agent used in vinegar and spirit production?
 - iii. What are the safety and health precautions for cleaning agent?
- Step 2:** Monitor the activity and ask trainees to write their findings on papers, flip chart, blackboard, or white board.
- Step 3:** Engage trainees to present their answers and choose the correct ones.
- Step 4:** Provide the expert view and clarify ideas by using didactic materials.
- Step 5:** Address any questions or concerns.
- Step 6:** Ask trainees to read the key readings 1.2.1 in trainee manual.



Points to Remember

- The effective cleaning of tools, equipment, and workplaces in vinegar and spirit production relies on a variety of agents, including detergents, water, acids, alkaline, and sanitizers.



Practical Activity 1.2.2: Selecting cleaning products used in vinegar and spirit production



Notes to the trainer

- Trainer is supposed to demonstrate how to select cleaning agent.
- For the effective delivery it is recommended to:
 - ✓ Avail cleaning agent used in vinegar and spirit production.



Key steps:

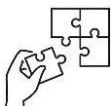
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the food processing workshop to select cleaning.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to select cleaning agent and explain selection criteria.
- Step 4:** Ask trainees to select cleaning agent.
- Step 5:** Verify whether the cleaning agent is selected and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.2.2. in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 1.2.



Points to Remember

- When preparing cleaning solutions, it is essential to follow precise mixing ratios according to the tasks, wear appropriate personal protective equipment and promptly follow procedures to ensure safe and effectiveness of cleaning.



Application of learning 1.2.

GAHIRE needs to establish a vinegar and spirit production industry near your school. Ask trainees to help him to select cleaning agents will be used when cleaning tools, equipment, and workplace for vinegar and spirit production.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cleaning agents are properly selected	1.1. Detergents are selected		
		1.2. Disinfectants are selected		
		1.3. Sanitizers are selected		
2	Cleaning agents are well prepared	2.1. Calculation is performed		
		2.2. Dilution is done		
		2.3. Record is kept		



Indicative content 1.3: Arranging the workplace



Duration: 2hrs



Practical Activity 1.3.1: Cleaning of workplace, tools and equipment in vinegar and spirit production



Notes to the trainer

- Trainer is supposed to demonstrate how to clean workplace, tools and equipment for vinegar and spirit production.
- For the effective delivery it is recommended to avail prepared cleaning agent for workplace, tools and equipment.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the food processing workshop to clean workplace, tools and equipment.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to clean workplace, tools and equipment. While demonstrating, explain cleaning procedure.
- Step 4:** Ask trainees to clean workplace, tools and equipment.
- Step 5:** Verify whether the workplace, tools and equipment are cleaned and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.3.1.in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.3.



Points to Remember

- Effective cleaning methods and technics for the workplace, tools, and equipment in fruit vinegar and spirit production are essential for maintaining hygiene and safety. It is recommended to respect appropriate cleaning steps according to the method and technique applied.



Practical Activity 1.3.2: Checking the effectiveness of cleaning process



Notes to the trainer

- Trainer is supposed to demonstrate how to check the effectiveness of cleaning process.
- For the effective delivery it is recommended to avail necessary instruments and or tools for checking the effectiveness of cleaning process.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit workshop to check the effectiveness of cleaning process.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to check the effectiveness of cleaning process. While demonstrating explain steps involved.
- Step 4:** Ask trainees to check the effectiveness of cleaning process.
- Step 5:** Verify whether the effectiveness of cleaning process is checked and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.3.2.in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.3.



Points to Remember

- Ensuring the effectiveness of cleanliness in vinegar and spirit production is crucial for maintaining product quality and safety. While testing the effectiveness, various methods such as visual inspection, swab tests, and acidity tests are used.



Practical Activity 1.3.3: Arranging the workplace.



Notes to the trainer

- Trainer is supposed to demonstrate how to arrange the workplace for vinegar and spirit.
- Avail workshop to arranged.



Key steps:

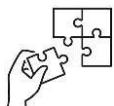
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit workshop to arrange the workplace.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to arrange the workplace. While demonstrating explain arrangement criteria and procedures.
- Step 4:** Ask trainees to arrange the workplace.
- Step 5:** Verify whether the workplace is arranged and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.3.3.in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.3.



Points to Remember

- Proper arrangement of equipment and tools in alignment with the production sequence enhances efficiency, maximize space, and improve quality control. Adhere to the arrangement criteria and procedures ensure the smooth and safe operation of facilities.



Application of learning 1.3.

Your uncle establishes a vinegar and spirit production industry. At this moment, the person in charge of workplace arrangement is sick and he/she did not attend. Ask trainees to help him to clean and arrange the workplace.

Checklist

SN	Criteria	Indicator	Score	
			Yes	No
1	Workplace is properly arranged	1.1 Tools and equipment are cleaned		
		1.2 Workplace is cleaned		
		1.3 The effectiveness of cleanliness is checked		
		1.4 Workplace is organized		



Indicative content 1.4: Receiving raw materials used in vinegar and spirit production



Duration: 2 hrs



Theoretical Activity 1.4.1: Description of raw materials used in vinegar and spirit production



Notes to the trainer:

- Trainer may use small groups for describing tools and equipment used in vinegar and spirit production.
- Trainer may use drawings, pictures, videos, audio visuals as didactic material for describing raw material used in vinegar and spirit production.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to answer the following questions:
- What are the fruits used for:
 - Spirit production?
 - Vinegar production?
 - What are the additional ingredients for vinegar and spirit production?
- Step 2:** Ask trainees to write their findings on papers, flip chart, blackboard, or white board.
- Step 3:** Engage trainees to present their answers.
- Step 4:** Provide the expert view and clarify ideas by using didactic materials.
- Step 5:** Address any questions or concerns.
- Step 6:** Ask trainees to read the key readings 1.4.1 in trainee manual.



Points to Remember

- The quality of vinegar and spirits relies on raw material and ingredients used. The fruits rich in sugar and acidity are preferred due to its high-quality product with a unique flavors.



Practical Activity 1.4.2: Receiving raw material for vinegar and spirit production



Notes to the trainer

- Trainer is supposed to demonstrate how to receive raw material used in vinegar and spirit production.
- For the effective delivery it is recommended to avail fruits and other additional ingredients used in vinegar and spirit production.



Key steps:

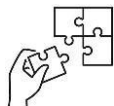
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit production workshop to receive raw material for vinegar and spirit production.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to receive raw material for vinegar and spirit production. While demonstrating explain acceptance criteria and reception procedures.
- Step 4:** Ask trainees to receive raw material for vinegar and spirit production.
- Step 5:** Verify whether the raw materials are received and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.4.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 1.4



Points to Remember

- To ensure the optimal fruits reception for vinegar and spirit production, only high-quality fruits that meet specific acceptance criteria should be selected.



Application of learning 1.4.

Your uncle establishes a vinegar and spirit production industry. At this moment, the person in charge of fruit reception is not attending the job. Ask trainees to help him to receive the raw material for vinegar and spirit production.

Checklist

SN	Criteria	Indicator	Score	
			Yes	No
1	Raw materials are well received	1.1 Fruits are received		
		1.2 Additional ingredients are received		



Indicative content 1.5: Cleaning of fruits



Duration: 2hrs



Practical Activity 1.5.1: Cleaning fruits



Notes to the trainer

- Trainer is supposed to demonstrate how to clean fruits.
- For the effective delivery it is recommended to avail fruits for cleaning



Key steps:

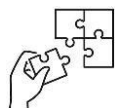
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit production to clean fruits.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to clean fruits. While demonstrating explain the procedure.
- Step 4:** Ask trainees to clean fruits.
- Step 5:** Verify whether the fruits are cleaned and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.5.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning1.5



Points to Remember

- Cleaning fruits before using them in vinegar and spirit production is essential for ensuring product safety, removing dirt and contaminants, and preventing harmful microorganisms.



Application of learning 1.5

Your uncle establishes a vinegar and spirit production industry. At this moment, the person in charge of cleaning is not attending the job. You are asked to help him to clean fruit for vinegar and spirit production.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Fruits are well cleaned	1.1 Appropriate Cleaning agent is used.		
		1.2 Appropriate cleaning technics for fruits is applied		
		1.3 Cleaned Fruits are dried		



Indicative content 1.6: Storing Vinegar and spirit raw material



Duration: 2hrs



Theoretical Activity 1.6.1: Description of raw material storage conditions



Notes to the trainer:

- Trainer may use small groups for describing storage conditions of raw material for vinegar and spirit production.
- Trainer may use videos, audio visuals as didactic material for describing storage conditions of raw material for vinegar and spirit production.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- i. What do you understand by the Term storage?
- ii. What are storage conditions of fruits?
- iii. What are the storage conditions of Vinegar and spirit ingredients?

Step 2: Monitor the activity and ask trainees to write their findings on papers, flip chart, blackboard, or white board.

Step 3: Asks trainees to present their answers and choose the correct ones.

Step 4: Provide the expert view and clarify ideas by using didactic materials.

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key readings 1.6.1 in trainee manual.



Points to Remember

- The right storage conditions maximize the quality and longevity of raw material and ingredients used in vinegar and spirit production, while minimizing spoilage and waste.



Practical Activity 1.6.2: Storing raw material



Notes to the trainer

- Trainer is supposed to demonstrate how to store raw material.
- For the effective delivery it is recommended to avail fruits for storing.



Key steps:

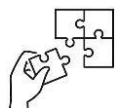
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit production workshop to store raw material for vinegar and spirit production.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to store raw material for vinegar and spirit production. While demonstrating explain storage conditions.
- Step 4:** Ask trainees to store raw material for vinegar and spirit production.
- Step 5:** Verify whether the raw material is stored and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 1.6.2 in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 1.6



Points to Remember

- By effective control of temperature and humidity, prevent spoilage and contamination. Proper storage of raw materials for vinegar and spirit production is crucial to maintain quality and safety.



Application of learning 1.6.

Request the trainees to visit vinegar and spirit processing plant near your school and ask them to store raw material in storage. Ask them to make a report about the activity done.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Raw materials are well stored	1.1. Fruits are stored		
		1.2. Starter cultures are stored		
		1.3. Sugar is stored		
		1.4. Report is done		
2.	Field visit report is done	2.1 Trainee identification is mentioned		
		2.2 Company identification is mentioned		
		2.3 Key competencies gained are described		
		2.4 Recommendation are mentioned		



Learning outcome 1 end assessment

Written assessment

1. Read the following statement and complete them by using correct terms in the brackets (Cooling, Yeasts, Brix, Culture, Ethylene).

- i)used for fermentation sealed tightly in container to avoid contamination.
- ii)is natural hormone in which fruits emit them self to stimulate ripening process.
- iii)is done to remove heat from the fruits, which is detrimental to keeping quality of fruits, it is done to retard the ripening and senescence processes.
- iv) The sugar content is measured in terms of level, indicates the sweetness of the fruit.
- v) refers to a specific group of microorganisms, such as yeasts or bacteria, that are introduced to initiate and drive the fermentation process.

Answer:

- i) Yeast
- ii) Ethylene
- iii) Cooling
- iv) Brix
- v) Culture

Q2. Read the statement below and Answer by **TRUE** if the statement is correct or **FALSE** if the statement is wrong.

- i) Acetic acid bacteria thrive in anaerobic conditions (without oxygen) during vinegar production.
- ii) Saccharomyces cerevisiae is a type of yeast used during spirit production to convert sugars into ethanol.
- iii) All tools and equipment should be arranged according to when they will be used in the production.
- iv) Standard operating procedures refers to the sequence of operations involved in the production process.
- v) Before using one of cleaning product, you are recommended to read the product label.

Answer:

- I. False
- II. True
- III. True
- IV. False

V. True

Q3. Read the following statement and answer by circling a letter corresponding the correct answer.

i) Which material is commonly used for tools and equipment that meet international food hygiene standards?

- a) Aluminium
- b) Plastic
- c) Stainless steel
- d) Wood

ii) Why is proper calibration important in vinegar and spirit processing?

- a) It helps maintain consistency in production
- b) It ensures safety
- c) It saves time and effort
- d) It increases the durability of equipment

iii) What is the role of adding sugar in vinegar and spirit production?

- a) To increase durability
- b) To provide food for microorganisms
- c) To add color to the final product
- d) To enhance acidity

iv) Which equipment is used to extract juice

- a) Cooling Tank
- b) Brew Barrels
- c) Juicer
- d) Labelling Machine

v) One of the following is not selection criteria of tools and equipment

- a) Durability
- b) Cost
- c) Working condition of tools and equipment
- d) Workshop location

Answer:

- i. c) Stainless steel
- ii. a) It helps maintain consistency in production
- iii. b) To provide food for microorganisms
- iv. c) Juicer
- v. d) workshop location

Q4. Matching the following equipment that used in vinegar production with their uses. the column A is the name of equipment and column B is the uses of equipment. And write the corresponding letter in the answer's column.

ANSWER	Column A	Column B
1.....	A. Distillation Columns	i. are used to securely place caps on bottles after filling.
2.....	B. Capping Machine	ii. is equipment using rapidly rotating blades to cut and break down fruits.
3.....	C. Pasteurizer:	iii. are used in spirit production to separate alcohol from the fermented mixture based on boiling points.
4.....	D. Blender	iv. This equipment heats juice liquids to a specific temperature to kill harmful bacteria and microorganisms.
5.....	E.	v. is equipment used to remove the skins from fruits.

Answer:

1. A iii
2. B i
3. C iv
4. D ii

Practical assessment

S&B Ltd is a vinegar and spirit processing company located in Ruhango district, they got a sponsor to give them new tools and equipment together with raw material for vinegar and spirit production unfortunately, they don't have a qualified technician for receiving tools, equipment, and raw materials. You are requested to receive and store 100kg of sugar, 10 packs of yeast, 10 packs of Acetobacters and 200kg of pineapple fruits. The activity will be performed at S&B Ltd in 2 hours.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Workplace, tools and equipment are well prepared	1.1 Tools are selected		
		1.2 Equipment are selected		
		1.3 Cleaning products are selected		
		1.4 Workplace is cleaned		
		1.5 Workplace is arranged		
2	Raw materials and ingredients are well received	2.1 Pineapple are received		
		2.2 Pineapple are sorted		
		2.3 Sugar is received		
		2.4 Yeast are received		
		2.5 Acetobacters are received		
3	Raw materials and ingredients are well cleaned	3.1 Pineapple fruits and cleaning product are selected		
		3.2 Pineapple fruits are cleaned		
4	Raw material and ingredients are properly stored	4.1 Fruits storage conditions are respected		
		4.2 Cultures storage conditions are respected		
		4.3 Sugar storage conditions are respected		

END



Further information to the trainer

Górak, A. &. (2014). Distillation: fundamentals and principles. . Academic Press.

Górak, A. &. (2014). Distillation: fundamentals and principles. Academic Press.

Learning Outcome 2: Conduct Alcoholic Fermentation



Indicative contents

- 2.1. Extracting Fruits Juice**
- 2.2. Standardizing of Juice**
- 2.3. Pasteurizing of Fruits and Vegetable Juice**
- 2.4. Monitoring Juice Fermentation**

Key Competencies for Learning Outcome 2: Conduct Alcoholic Fermentation

Knowledge	Skills	Attitudes
• Description of pasteurization method and technics • Description of factor affecting alcoholic fermentation	• Extracting fruits juice • Screening filtration of juice • Checking quality of juice • Adjusting brix of juice • Pasteurizing juice • Cooling of juice for vinegar and spirit production • Inoculating juice • Checking levels of alcohol	• Being careful while extracting and filtrating fruit juice. • Being accurate while checking the quality of juice. • Being precise while adjusting brix of juice • Being accurate while inoculating juice.



Duration: 15 hrs

Learning outcome 2 objectives:



By the end of the learning outcome, the trainees will be able to:

1. Extract correctly the fruit juice according to standard operating procedures.
2. Apply correctly the screen filtration methods according to juice quality requirement.
3. Check accurately the quality of juice according to product specification.
4. Adjust properly the brix of juice according to the intended uses.
5. Pasteurize correctly the juice according to pasteurization conditions.
6. Cool properly the juice for vinegar and spirit production according to cooling conditions.
7. Inoculate correctly the juice according to the inoculation condition.
8. Describe clearly the factors affecting alcoholic fermentation based on fermentation conditions.
9. Check effectively the levels of alcohol according to product quality requirement



Resources

Equipment	Tools	Materials
• Pasteurizer • Slicing machine • Cooling tank • Boiling pans • Blender • PPE • Cooker • Juice extracting machine • Pressing machine • Crushing machine • Working table • Fermentation Tanks	• Knives • Spoons • Refractometer • Thermometer • Jugs • Analytical balances • Cutting boards • Brew barrels/brew bucket • Graduated cylinder • Alcoholmeters • Glassware • Vinometer • PH meter	• Banana • Passion fruits • Pineapple • Straw berry • Sugar • Water • Preservatives • Cultures • Gas lighter • Filter cloths • Sponges • Towels



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail classroom and prepared workshop for alcoholic fermentation.
- Avail tools, material, and equipment for alcoholic fermentation.
- Prepare teaching aids and didactic material (videos, Audio visuals, manual/guide, protocols) for alcoholic fermentation



Indicative content 2.1: Extracting fruits juice



Duration: 2hrs



Practical Activity 2.1.1: Extracting juice



Notes to the trainer

- The trainer may use individual based activity and demonstrate how to extract juice.
- Avail required tools, and equipment for extracting juice.



Key steps:

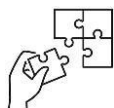
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the food processing workshop to extract juice.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to extract juice. While demonstrating explain juice extraction technics and their procedures.
- Step 4:** Ask trainees to extract juice.
- Step 5:** Verify whether the juice is properly extracted and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.1.1.in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.1.



Points to Remember

- For maximizing the juice quality and quantity, juice extraction technics should be chosen basing on the fruits properties and the obtained juice should be filtrated by using effective method.



Application of learning 2.1.

Your school staff is preparing to celebrate five years anniversary, and they need to prepare pineapple juice for vinegar production. Request your trainees to help your school to extract pineapple juice and perform filtration of obtained juice.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Juice is properly extracted	1.1 Juice is extracted		
		1.2 Juice is filtrated		
		1.3 Screen filtration method is used		



Indicative content 2.2: Standardizing juice



Duration : 3hrs



Practical Activity 2.2.1: Standardizing juice



Notes to the trainer

- Trainer is supposed to demonstrate how to standardize juice for vinegar and spirit making.
- For the effective delivery it is recommended to avail juice and instruments to be used in standardizing the juice for vinegar and spirit making.



Key steps:

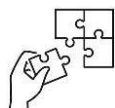
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit workshop to standardize the juice for vinegar and spirit making.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to standardize the juice for vinegar and spirit making. While demonstrating explain procedures and steps involved.
- Step 4:** Ask trainees to standardize the juice for vinegar and spirit making.
- Step 5:** Verify whether the juice is standardized and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.2.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.2



Points to Remember

- The quality parameters of juice, such as pH and Brix, are crucial for the successful fermentation process and the production of high-quality vinegar and spirits.



Application of learning 2.2.

Organise a field trip and ask trainees to visit a spirit and vinegar industry and help them to standardize the juice for vinegar and spirit production, adjust PH to 3.0 and sugar content to 15%.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Juice is properly standardized	1.1 PH is measured		
		1.2 Brix is measured		
		1.3 Brix is adjusted		
2	Field visit report is done	2.1 Trainee identification is mentioned		
		2.2 Company identification is mentioned		
		2.3 Key competencies gained are described		
		2.4 Recommendation are mentioned		



Indicative content 2.3: Pasteurizing of fruits and vegetable juice



Duration: 2hrs



Practical Activity 2.3.1: Pasteurizing juice



Notes to the trainer

- Trainer is supposed to demonstrate how to pasteurize juice.
- For the effective delivery it is recommended to avail pasteurizer machine and other required tools and equipment for juice pasteurization.



Key steps:

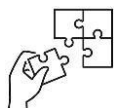
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit workshop to pasteurize juice.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to pasteurize juice.
- Step 4:** Ask trainees to pasteurize juice.
- Step 5:** Verify whether the juice is pasteurized and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.3.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.3



Points to Remember

- Juice pasteurization is a process that involves heating juice to a specific temperature for a set of time to eliminate harmful bacteria and pathogens. Pasteurization methods and techniques are essential processes used to ensure the safety and quality of juice by eliminating harmful microorganisms. For the effective pasteurization, you are recommended to follow the procedure for selected method and technique.



Application of learning 2.3.

The school needs to prepare 100l of juice for vinegar and spirit production. Ask trainees to go to the food processing workshop to pasteurize it.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Juice is properly pasteurized	1.1 Juice is pasteurized		
		1.2 Pasteurization temperature is monitored		
		1.3 Pasteurization time is respected		



Indicative content 2.4: Monitoring juice fermentation



Duration: 8 hrs



Practical Activity 2.4.1: Fermenting the juice



Notes to the trainer

- Trainer is supposed to demonstrate how to ferment the juice for vinegar and spirit production.
- For the effective delivery it is recommended to avail tools and equipment for fermenting the juice for vinegar and spirit production.
- Prepare videos and protocols as didactic material for juice fermentation for vinegar and spirit production is required.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit production workshop to ferment the juice.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to ferment the juice for vinegar and spirit production. While demonstrating explain cooling and inoculation procedures.
- Step 4:** Ask trainees to ferment the juice for vinegar and spirit production.
- Step 5:** Verify whether the juice is fermented and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.4.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.4.



Points to Remember

- For effective fermentation process use appropriately prepared yeast culture and control temperature before inoculation, this will facilitate their viability and their effective work.



Theoretical Activity 2.4.2: Description of factor affecting alcoholic fermentation



Notes to the trainer:

- Trainer may use small groups for describing factor affecting alcoholic fermentation.
- The use of videos, audio visuals as didactic material for describing factor affecting alcoholic fermentation is required.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- i. What are the factors affecting alcoholic fermentation.

Step 2: Engage trainees to write their findings on papers, flip chart, blackboard, or white board.

Step 3: Asks trainees to present their answers and choose the correct ones.

Step 4: Provide the expert view and clarify ideas by using didactic materials.

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key readings 2.4.2 in trainee manual.



Points to Remember

- In alcoholic fermentation, temperature, pH, aeration, substrate concentration, and nutrient availability are the key factors that influence yeast activity, fermentation efficiency, and product quality.



Practical Activity 2.4.3: Checking levels of alcohol



Notes to the trainer

- Trainer is supposed to demonstrate how to check levels of alcohol.
- For the effective delivery it is recommended to avail instruments for checking the levels of alcohol.
- Prepare videos as didactic material for checking the alcohol level is required.



Key steps:

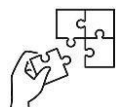
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit workshop to Check levels of alcohol.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to check levels of alcohol in fermented liquid for vinegar and spirit production.
- Step 4:** Ask trainees to Check levels of alcohol in fermented liquid.
- Step 5:** Verify whether Alcohol level is checked and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 2.4.3 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 2.4.



Points to Remember

- Accurate measurement of the alcohol level in fermented liquids is essential for vinegar and spirit production. Care should be taken during use of measuring instrument for reducing errors.



Application of learning 2.4

The school needs to prepare wine for vinegar production. Request your trainee to help the school to prepare and check the level of alcohol of that wine.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Juice is well fermented	1.1 Juice is cooled		
		1.2 Yeast culture is prepared		
		1.3 Fermentation process is monitored		
2	Alcohol level is well checked	2.1 Appropriate instrument is used		
		2.2 Procedure for Alcohol level checking is respected		



Learning outcome 2 end assessment

Written assessment

Q1. Read the following statement and complete them by using correct terms in the brackets (Force, inoculation, substrate concentration, Pectinase, Batch Pasteurization, substrate concentration).

- a) Helps to break down insoluble pectin in the fruits and in turn, produce more juice when extracted.
- b) Centrifugation is defined as the juice extraction method by which centrifugal..... reduce particle size and produce juice.
- c)is a pasteurization technique where a fixed quantity of juice is heated at a time.
- d) is considered as the process of introducing yeast strains into the must/juice to initiate fermentation.
- e) refers to the amount of sugar present in the fermentation medium.

Answer:

- a) Pectinase
- b) Force
- c) Batch pasteurization.
- d) Inoculation
- e) Substrate concentration

Q2. Read the following statement and Answer by true (T) if the statement is correct or false (F) if the statement is wrong.

- a) High sugar content in fermentation medium can cause Osmotic stress to the yeast.
- b) Yeast requires Carbon dioxide during its initial growth phase.
- c) The temperature for alcoholic fermentation is 20°C
- d) Leftover sugars (residual sugar) can make the beverage sweeter than desired.
- e) Vinometer is used to measure Acidity of fermented liquid.

Answer:

- a) True
- b) False
- c) True
- d) True
- e) False

Q3. Read the following statement and answer by circling a letter corresponding to the correct answer.

- a) What does a 10% Alcohol by Volume (ABV) in a beverage mean?
 - i) There are 10 ml of pure alcohol in every 1 liter of the beverage.

- ii) There are 10 ml of pure alcohol in every 100 ml of the beverage.
 - iii) There are 10 ml of fermented liquid in every 100 ml of alcohol.
 - iv) The beverage is 10% water and 90% alcohol.
- b) Which of the following factors can negatively impact the alcoholic fermentation process if not adequately controlled?
- i) High temperatures above 30°C
 - ii) aeration during the anaerobic phase
 - iii) Substrate concentration that is too high or too low
 - iv) All the above
- c) What happens if the temperature during fermentation exceeds 30°C?
- i) Yeast becomes more active, speeding up fermentation.
 - ii) Yeast becomes inactive, and fermentation stops.
 - iii) pH levels increase, improving flavour.
 - iv) Alcohol content increases
- d) What is the main role of pH in the fermentation process?
- i) It controls yeast growth.
 - ii) It increases the sugar concentration in the must
 - iii) It affects the growth of undesirable bacteria and overall fermentation quality
 - iv) It regulates oxygen levels.
- e) Which of the following is a key benefit of cooling juice during fermentation?
- i) Enhancing the growth of unwanted microorganisms
 - ii) Speeding up the fermentation process
 - iii) Increasing yeast activity at higher temperatures
 - iv) Preserving volatile aromatic compounds

Answer:

- a) ii
- b) iv
- c) ii
- d) iii
- e) iv

Q4. Matching the statement in column A and column B and write the corresponding letter in the answer's column.

ANSWER	Column A	Column B
1.....	A. Refractometer	i. is a measure of the acidity or basicity of a solution.
2.....	B. pH	ii. is a measurement of the sugar content in a liquid .
3.....	C. pH meter	iii. Instrument used to measure sugar content.

4.....	D. Brix level	iv. are a group of enzymes that break down hemicelluloses, a polysaccharide that is found in the cell walls of fruits.
5.....	E.	v. instrument used to measure Ph of juice.

Answer:

1. A iii
2. B i
3. C v
4. D ii

Practical assessment

BCD Ltd is vinegar and spirit processing industry, they need to ferment a juice for vinegar and spirit. Unfortunately, they do not have a technician for fermentation. The managing director requested you to perform the fermentation of pineapple juice. The fermented liquid should have 4 pH. The activity should be performed at BCD Ltd in 3 hours.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Juice is well extracted	1.1 Juice is extracted		
		1.2 Juice is filtrated		
2	Juice is standardized according to the intended use	2.1 Brix is measured		
		2.2 Brix is adjusted		
3	Juice is well pasteurized	3.1 Pasteurization method is applied		
		3.2 Pasteurization technique is applied		
4	Alcoholic fermentation is properly performed.	4.1 Cooling is performed		
		4.2 Culture is prepared		
		4.3 Fermentation process is monitored		
		4.4 Alcohol level is checked		

END



Further information to the trainer

Górak, A. &. (2014). Distillation: fundamentals and principles. . Academic Press.

Górak, A. &. (2014). Distillation: fundamentals and principles. Academic Press.

Learning Outcome 3: Make Vinegar



Indicative contents

3.1 Fermenting Acetic Acid

3.2 Filtrating Vinegar

3.3 Analysing Vinegar Quality

3.4 Storing Vinegar

Key Competencies for Learning Outcome 3: Make Vinegar

Knowledge	Skills	Attitudes
• Description of acetic acid fermentations. • Description of vinegar filtration methods. • Description of the quality of vinegar.	• Selecting material for acetic acid fermentation. • Performing acetic acid fermentation. • Filtrating vinegar • Analysing Vinegar quality • Selecting packaging materials for fruits vinegar • Washing and sterilization of packaging material • Filling fruits vinegar. • Labelling of fruits vinegar • Applying packaging levels (primary, secondary, tertiary) • Storing fruits vinegar	• Being specific in selecting materials of acetic acid fermentation. • Being accurate in fermenting jus for vinegar and spirit making • Being careful while filtrating, filling and labelling vinegar. • Being accountable while storing vinegar.



Duration: 15 hrs

Learning outcome 3 objectives:



By the end of the learning outcome, the trainees will be able to:

1. Describe clearly material for acetic acid fermentation according to the vinegar production.
2. Select properly material for acetic acid fermentation according to the standard requirement.
3. Describe correctly acetic acid fermentations according to fermentation conditions.
4. Perform correctly acetic acid fermentation according to fermentation conditions.
5. Filtrate correctly fruit vinegar according to vinegar specifications.
6. Analyze clearly the Vinegar quality of fruits vinegar basing quality attribute according to product specification.
7. Package properly fruits vinegar in packaging materials according to standard operating procedure.
8. Store appropriately vinegar according to storage conditions



Resources

Equipment	Tools	Materials
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• Washing machine • PPE • Vacuum cleaner • Working table • Packaging machine • Fermentation tanks • Filling machine • Capping machine • Sealing machine • Labelling machine • Coding machine	• Knives • Spoons • Refractometer • Thermometer • Jugs • Analytical balances • Cutting boards • Brushes • Dustbin • Bucket • Brew barrels • Brew bucket • Squeegee • Mop • Graduated cylinder • Alcoholmeters • Vinometer • Glassware • Ph meter	• Packaging materials • Labels • Cultures • Filter cloths • Sponges • Towels • Disinfectants • Water • Alcoholic liquid • Acetobacter culture • Acetozym nutrients
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Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail fruit alcoholic liquid
- Avail classroom and prepared workshop for vinegar processing.
- Avail tools, material and equipment for fruits vinegar processing.
- Prepare teaching aids and didactic material (videos, photo, manual/guide, for vinegar production is required).



Indicative content 3.1: Fermenting acetic acid



Duration: 5 hrs



Practical Activity 3. 1. 1: Performing acetic acid fermentation



Notes to the trainer

- The trainer may use individual based activity and demonstrate how to perform vinegar fermentation.
- Avail required material for acetic acid fermentation.
- Avail tutorial videos for acetic acid fermentation as didactic material.



Key steps:

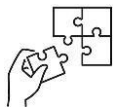
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar processing workshop to perform acetic acid fermentation.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated).
- Step 3:** Demonstrate how to perform acetic acid fermentation. While demonstrating explain steps involved in vinegar fermentation.
- Step 4:** Asks trainees to Perform acetic acid fermentation.
- Step 5:** Verify whether acetic acid fermentation is correctly performed and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.1.1 in trainee training manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.1.



Points to Remember

- Make sure alcoholic liquid for vinegar production has concentration of 5.5-9%, and Use vital Acetobacter for converting ethanol into acetic acid.



Application of learning 3.1.

Your sister/ family member needs to prepare salad to be used in her birthday. Help her to ferment acetic acid to be used in preparing salad.

Checklist

SN	Criteria	Indicators	Yes	No
1	Materials for acetic acid fermentation are well selected.	1.1: Alcoholic liquid is selected		
		1.2 Acetobacters are selected		
		1.3 Acetozym are selected		
2	Fermentation is properly performed.	2.1 Acetobacters is added to alcoholic liquid		
		2.2 Temperature is respected		
		2.3 Aeration is done		
		2.4 Acidic level is respected		



Indicative content 3.2: Filtrating Vinegar



Duration: 4 hrs



Practical Activity 3. 2. 1: Filtrating fruits vinegar



Notes to the trainer

- The trainer may use individual based activity and demonstrate how to filtrate fruits vinegar.
- Avail required tools and equipment for vinegar filtration.
- Avail tutorial videos and protocol for vinegar filtration as didactic material.



Key steps:

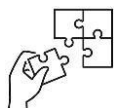
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar production workshop to filtrate fruits vinegar.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated).
- Step 3:** Demonstrate how to filtrate fruits vinegar.
- Step 4:** Asks trainees to filtrate fruits vinegar.
- Step 5:** Verify whether filtration process is correctly performed and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.2.1 in trainee training manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.2



Points to Remember

- Choose types of vinegar filtration methods which is appropriate to remove undesirable particles to achieve desirable clarification of fruits vinegar.



Application of learning 3.2.

Your family members have prepared vinegar for their clients. Ask the trainees to help her to filtrate the vinegar.

Checklist:

SN	Criteria	Indicators	Yes	No
1	Filtration is properly performed	1.1. Filter medium is selected		
		1.2. Filtration is done		
		1.3. Factors affecting vinegar filtration are controlled		



Indicative content 3.3: Analysing Vinegar Quality



Duration: 3 hrs



Practical Activity 3.3.1: Analysing the quality of fruits Vinegar.



Notes to the trainer

- The trainer may use individual based activity and demonstrate how to analyse the quality of fruits Vinegar.
- Avail required instruments and tools for analysing the quality of fruits vinegar.
- Avail tutorial videos for analysing the quality of fruits Vinegar as didactic material.



Key steps:

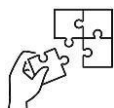
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go in the vinegar processing workshop to analyse the quality of fruits Vinegar.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated).
- Step 3:** Demonstrate how to analyse the quality of fruits Vinegar.
- Step 4:** Ask trainees to analyse the quality of fruits Vinegar.
- Step 5:** Verify whether the quality of fruits vinegar is well analysed and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.3.1 in trainee training manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.3



Points to Remember

- For effective quality analysing of fruits vinegar, make sure all instrument work properly.



Application of learning 3.3.

Your school recommend the supplier to make vinegar to be used during learning process. You are requested to go to the vinegar processing workshop to analyse the quality of the fruits vinegar received.

Checklist

SN	Criteria	Indicators	Yes	No
1.	Sensory evaluation is performed.	1.1 Aroma is evaluated.		
		1.2 Taste is assessed		
2.	Chemical Analysis is correctly performed.	2.1 Acetic Acid Content is analysed.		
		2.2 pH analysis is performed.		



Indicative content 3. 4: Storing Vinegar



Duration: 3 hrs



Practical Activity 3. 4. 1: Packaging fruits vinegar.



Notes to the trainer

- Trainer is supposed to demonstrate how to Package fruits vinegar.
- For the effective delivery it is recommended to avail packaging machine, packaging materials and tools and equipment.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar processing workshop to package vinegar.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated).
- Step 3:** Demonstrate how to package vinegar products.
- Step 4:** Ask trainees to package vinegar.
- Step 5:** Verify whether fruits vinegar is packaged and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.4.1 in trainee training manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.4



Points to Remember

- For effective packaging, use sterilized packaging material and make sure that packaging material is effectively sealed to prevent leakage and contamination.



Practical Activity 3.4.2: Labelling fruits vinegar.



Notes to the trainer

- Trainer is supposed to demonstrate how to label vinegar.
- For the effective delivery it is recommended to avail materials, tools and equipment for labelling vinegar.
- Prepare videos and protocols as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar production workshop to perform labelling of vinegar.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated).
- Step 3:** Demonstrate how to perform labelling of vinegar.
- Step 4:** Ask trainees to perform labelling of vinegar.
- Step 5:** Verify whether the vinegar is labelled and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3.4.2 in trainee training manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.4



Points to Remember

- During labelling vinegar check if all necessary information is indicated on label.



Practical Activity 3.4.3: Storing fruits vinegar.



Notes to the trainer

- Trainer may demonstrate how to store vinegar.
- For the effective delivery it is recommended to avail materials, tools and equipment for storing vinegar.
- Prepare videos and protocols as didactic materials for vinegar storing.



Key steps:

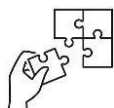
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar processing workshop to store fruits vinegar.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated).
- Step 3:** Demonstrate how to store fruits vinegar.
- Step 4:** Ask trainees to store vinegar.
- Step 5:** Verify whether the vinegar is stored and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 3. 4. 3: in trainee training manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 3.4



Points to Remember

- For effective vinegar storage temperature and relative humidity should be consistently maintained in a range of 15-20⁰c and 50-70% respectively while keeping bottles upright, especially to those sealed with cork.



Application of learning 3.4.

Organize a visit and ask trainees to go to the vinegar production industry in their Province and participate in packaging, labelling, and storing vinegar.

Checklist

SN	Criteria	Indicators	Yes	No
1.	Vinegar is appropriately packaged	1.1 Packaging materials are selected.		
		1.2 Packaging materials are washed		
		1.3 Packaging materials are sterilized		
		1.4 Filling is done		
		1.5 Packaging level respected		
2.	Vinegar is appropriately labelled.	2.1 Label is designed		
		2.2 Labelling information is indicated.		
		2.3 Labelling is done		
3.	Vinegar and spirit are well stored	3.1 Storage conditions are monitored		
		3.2 Stock is arranged		
4	Field visit report is done	3.1 Trainee identification is mentioned		
		3.2 Company identification is mentioned		
		3.3 Key competencies gained are described		
		3.4 Recommendation are mentioned		



Learning outcome 3 end assessment

Written assessment

1. Read the following statement about acetic acid fermentation conditions and Answer by true (T) if it is correct or false (F) if it is wrong.

- a) Aeration is not important for Acetobacter because it is anaerobic.
- b) Industrial setups use aeration systems or open vats to provide oxygen to the culture.
- c) The optimal temperature for acetic fermentation is around 40°C.
- d) Lower temperatures can speed up the fermentation process.
- e) Higher temperatures during fermentation can kill Acetobacter.
- f) Acetic acid production increases the pH of the liquid during fermentation
- g) Highly acidic environment can promote the growth of Acetobacter.

Answer:

- a) False
- b) True
- c) False
- d) False
- e) True
- f) False
- g) False

2. Read the following statement and Match the column A and column B with explanation of methods of packaging sterilization.

Answer	Column A	Column B
A.....	A. Autoclaving	(i). Glass containers can be sterilized at temperature between 160°C and 180°C for 1–2 hours, This is effective for killing spores and pathogens
B.....	B. Dry Heat	(ii). method that use high-pressure steam at 121°C for 15–20 minutes to sterilize glass bottles
C.....	C. Steam Sterilization	(iii). Glass containers can be exposed to pressurized steam. The bottles are passed through steam chambers where they are sterilized by the heat and moisture

Answer.

A=ii

B=i

C=iii

3. Read the following statement and answer by circling a letter corresponding to the correct Answer.

I. Which is one of the primary functions of packaging in relation to environmental factors?

- a. Branding and Marketing
- b. Compliance
- c. Protection
- d. Convenience

Answer: C

II. How does packaging help in extending the shelf life of vinegar?

- a. By making it easier to pour
- b. By providing information about ingredients
- c. By preventing oxidation and bacterial growth
- d. By displaying logos and designs

Answer: C

III. Which packaging feature enhances consumer ease when handling vinegar?

- a. Protection from contaminants
- b. Convenience
- c. Compliance
- d. Preservation

Answer: B

IV. What role does packaging play in terms of branding and marketing?

- a. It safeguards the product during transportation.
- b. It helps differentiate the product from competitors.
- c. It prevents bacterial growth.
- d. It provides expiration dates.

Answer: B

V. What important details does packaging usually contain?

- a. Information about competitors
- b. Nutritional information, expiration dates, and usage instructions
- c. Methods for handling vinegar
- d. Designs to attract customers.

Answer: B

VI. How does packaging ensure that a product meets regulatory requirements?

- a. By providing a convenient pouring method
- b. By complying with labeling standards, safety warnings, and legal obligations
- c. By offering easy-to-handle containers
- d. By extending the shelf life of the vinegar

Answer: B

4. Complete the empty space by the following filtration factors for optimizing vinegar clarity, quality, and microbial stability: Flow rate, Frequent Cleaning, Poor Maintenance, Filter Cake, Longer Time, Temperature, Pore sizes.

- a) Increasing theslightly can reduce the viscosity of the vinegar and make filtration easier.
- b) Slower allows for better filtration quality, as there is more time for the particles to be trapped by the filter.
- c) can allow more particles to be captured, improving clarity, but it reduces process efficiency.
- d) Particles captured by the filter medium and accumulated to form.....
- e) Smallerare necessary to achieve a crystal-clear vinegar but may slow down the process. Answer:

Answer

- a) Temperature
- b) Flow rate
- c) Longer Time
- d) Filter Cake
- e) Pore sizes

Practical assessment

TOP Ltd is a vinegar processing company located in MUHANGA district Process different fruits vinegars. Therefore, UG Hotel demand apples cider vinegar from this company for preparing salad. Therefore, company has insufficient technicians, the manager decided to hire you as an expert in vinegar processing to process 10l of apple cider vinegar, with 5 to 5.5% pH and packaged in 75cl.

Checklist:

SN	Criteria	Indicators	Yes	No
1	Materials for acetic fermentation are well selected	1.1 Alcoholic liquid is selected		
		1.2 Acetobacters are selected		
		1.3 Acetozym are selected		
2	Fermentation is properly performed	2.1 Acetobacters is added to alcoholic liquid		
		2.2 Temperature is respected		
		2.3 Aeration is done		
		2.4 Acidic level is respected		
3	Filtration is properly performed	3.1 Filter medium is selected		
		3.2 Filtration is done		

		3.3 Factors affecting vinegar fermentation are maintained		
4	Sensory evaluation is performed	4.1 Aroma is evaluated.		
		4.2 Taste is assessed		
5	Chemical Analysis is performed.	5.1 Acetic Acid Content analysed.		
		5.2 pH is analysed		
6	Vinegar is appropriately packaged	6.1 Packaging materials are selected.		
		6.2 Packaging materials are washed		
		6.3 Packaging materials are sterilized		
		6.4 Filling is done		
		6.5 Packaging level respected		
7	Vinegar is appropriately labelled.	7.1 Label is designed		
		7.2 Labelling information is indicated.		
		7.3 Labelling is done		
8	Vinegar are well stored according	8.1 Storage conditions are monitored		
		8.2 Stock is arranged		

END



Further information to the trainer

Górak, A. &. (2014). *Distillation: fundamentals and principles*. . Academic Press.

Górak, A. &. (2014). *Distillation: fundamentals and principles*. Academic Press.

Learning Outcome 4: Make Spirit



Indicative contents

4.1 Distilling the Alcoholic Mixture/Liquid

4.2 Preparing Spirit Products

4.3 Storing Spirit Products

Key Competencies for Learning Outcome 4: Make Spirit

Knowledge	Skills	Attitudes
• Description of distillery • Description of spirit derivative types	• Distilling the alcoholic mixture/liquid • Extracting spirit • Separating distillate composition • Concentrating spirit • Formulating spirit derivative product • Packaging spirit product • Labelling spirit product • Storing spirit product	• Being careful in Extracting spirit • Being accurate while concentrating spirit • Being accountable during formulating spirit derivatives Product. • Being responsible in storing spirit product.



Duration: 20hrs

Learning outcome 4 objectives:



By the end of the learning outcome, the trainees will be able to:

1. Describe clearly distillery according to basing on the spirit specifications.
2. Extract appropriately spirits according to spirit specification.
3. Separate properly distillate composition according to the product specifications.
4. Concentrate correctly spirit according to the product specification.
5. Describe clearly spirit derivative types according to the product specification.
6. Formulate properly spirit derivative product according to product specifications.

7. Package effectively spirit product according to product specification.
8. Label correctly spirit product according to product specification.
9. Store properly spirit product according storage conditions.



Resources

Equipment	Tools	Materials
• Bottle washing machine • PPE • Working table • Fermentation tanks • Distillation columns • Distillation pot • Filling machine • Capping machine • Sealing machine • Labeling machine • Coding machine • Gas chromatography	• Refractometer • Thermometer • Analytical balances, • Brew barrels • Brew bucket • Graduated cylinder • Alcoholmeters • Glassware • Vinometer • Methanol essay kit, • p meter	• Water, • Disinfectants, • Packaging materials • Labels, • Gas lighter, • Filter cloths, • Sponges • Towels



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail classroom and prepared workshop for spirit making.
- Avail tools, material and equipment for spirit making.
- Prepare teaching aids and didactic material (videos, Audio visuals, manual/guide, protocols) for spirit making.



Indicative content 4.1: Distilling the alcoholic mixture/liquid



Duration: 8hrs



Theoretical Activity 4.1.1: Description of distillery



Notes to the trainer:

- Trainer may use small groups for describing distillery
- Trainer may use videos, audio visuals as didactic material for describing distillery



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to answer the following questions:
- i. How could you differentiate distillation and distillery?
 - ii. What could be the distillation principle?
 - iii. What are the distillation stages?
 - iv. What are the types of distilleries?
- Step 2:** Ask trainees to write their findings on papers, flip chart, blackboard, or white board.
- Step 3:** Engage trainees to present their answers and choose the correct ones.
- Step 4:** Provide the expert view and clarify ideas by using didactic materials.
- Step 5:** Address any questions or concerns.
- Step 6:** Ask trainees to read the key readings 4.1.1. in trainee manual.



Points to Remember

- Alcohol distillation is based on the differing boiling points of ethanol and water, which allows for the concentration and purification of alcohol through controlled heating, condensation and adhering on factor affecting alcoholic distillation.



Practical Activity 4.1.2: Distilling the alcoholic liquid/mixture



Notes to the trainer

- The trainer may use individual based activity and demonstrate how to distillate alcoholic liquid/mixture.
- Avail required tools, and equipment for distillate alcoholic liquid/mixture.



Key steps:

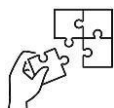
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit production workshop to distillate alcoholic liquid/mixture.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to distillate alcoholic liquid/mixture.
- Step 4:** Ask trainees to distillate alcoholic liquid/mixture.
- Step 5:** Verify whether the alcoholic liquid/mixture is distilled and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 4.1.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 4.1.



Points to Remember

- To achieve effective distillation, it's important to carefully control the temperature to maximize ethanol extraction while minimizing the presence of unwanted components in the distillate.



Application of learning 4.1.

Organise a field visit and ask trainees to visit a spirit processing plant near your school to participate in the distillation of Alcoholic mixture/liquid.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Fermented mixture is properly distilled	1.1. Fermented liquid is selected		
		1.2. Distillation method is applied		
		1.3. Distillate composition separation temperature is respected		
2.	Spirit quality is well analysed	2.1. Ethanol level is analysed		
		2.2. Methanol level is analysed		
		2.3. Congeners level is analysed		
3	Field visit report is done	3.1 Trainee identification is mentioned		
		3.2 Company identification is mentioned		
		3.3 Key competencies gained are described		
		3.4 Recommendation are mentioned		



Indicative content 4.2: Preparing Spirit products



Duration: 8 hrs



Theoretical Activity 4.2.1: Description of spirit derivative product



Notes to the trainer:

- Trainer may use small groups for describing spirit derivative product
- Trainer may use videos, audio visuals as didactic material for describing spirit derivative product.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to answer the following questions:
- What could be the types of spirit derivative product?
- Step 1:** Ask trainees to write their findings on papers, flip chart, blackboard, or white board.
- Step 2:** Asks trainees to present their answers and choose the correct ones.
- Step 3:** Provide the expert view and clarify ideas by using didactic materials.
- Step 4:** Address any questions or concerns.
- Step 5:** Ask trainees to read the key readings 4.2.1. in trainee manual.



Points to Remember

- By blending, flavouring, colouring, or sweetening spirits, you can create various products which are considered as spirit derivatives, such as gin, brandy, rum, whiskey, vodka, and liqueurs.



Practical Activity 4.2.2: Formulating spirit derivative product



Notes to the trainer

- Trainer is supposed to demonstrate how to formulate spirit derivative product.
- For the effective delivery it is recommended to avail materials, tools and equipment for spirit derivative product formulation.



Key steps:

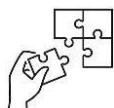
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the spirit processing workshop to formulate Spirit derivative product.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to formulate spirit derivative product. While demonstrating, explain the procedure.
- Step 4:** Ask trainees to Formulate Spirit derivative product.
- Step 5:** Verify whether Spirit derivative product is formulated and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 4.2.2. in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 4.2.



Points to Remember

- To produce a high-quality spirit derivative product, use natural flavouring agents, dilute with purified water to achieve the desired alcohol content, and ensure clarity through microfiltration.



Application of learning 4.2.

Organise a field visit to go to the spirit production industry and prepare a spirit derivative product flavoured by pineapple, with 40% alcoholic by volume (ABV) from concentrated spirit with 95% alcoholic by volume (ABV). Ask trainee to write a report.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Spirit derivative products are well produced	1.1 Blend is prepared		
		1.2 Spirit derivative product alcohol content is respected		
		1.3 Microfiltration is done		
		1.4 Sensory evaluation is done		
		1.5 Methanol level is detected		
2	Field visit report is well done	2.1 Trainee identification is mentioned		
		2.2 Company identification is mentioned		
		2.3 Key competencies gained are described		
		2.4 Recommendations are mentioned		



Indicative content 4.3: Storing Spirit products.



Duration: 4 hrs



Practical Activity 4.3.1. Packaging spirit product



Notes to the trainer

- Trainer is supposed to demonstrate how to package spirits product.
- For the effective delivery it is recommended to spirit packaging machine, packaging materials and other necessary materials, tools and equipment.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit processing workshop to package spirits products.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to package spirit products.
- Step 4:** Ask trainees to package spirit products.
- Step 5:** Verify whether the spirit products are packaged and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 4.3.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 4.3.



Points to Remember

- For effective packaging, select appropriate packaging material and package spirit in pre-sterilized bottle for preventing microbial contamination.
- Efficiently seal the packaging material for preventing leakage, contamination and maintain regulatory compliance.



Practical Activity 4.3.2: Labelling spirit products



Notes to the trainer

- Trainer is supposed to demonstrate how to label spirit products.
- For the effective delivery it is recommended to avail materials, tools and equipment for labelling spirit product.
- Prepare videos and protocols as didactic materials.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit processing workshop to perform labelling of spirits products.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to perform labelling of spirit product. While demonstrating explain labelling information and procedures for labelling.
- Step 4:** Ask trainees to perform labelling of spirit product.
- Step 5:** Verify whether the spirit products are labelled and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 4.3.2 in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 4.3



Points to Remember

- Before labelling check if all necessary information is indicated on label.



Practical Activity 4.3.3: Storing spirit product



Notes to the trainer

- Trainer may demonstrate how to store spirit products.
- For the effective delivery it is recommended to avail materials, tools and equipment for storing spirit products.
- Prepare videos and protocols as didactic materials.



Key steps:

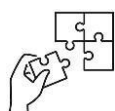
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the vinegar and spirit processing workshop to store spirit products.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to perform store spirit products. While demonstrating explain storage condition.
- Step 4:** Ask trainees to store spirit products.
- Step 5:** Verify whether the spirit products are stored and provide feedback where necessary.
- Step 6:** Ask trainees to read the key readings 4.3.3 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in application of learning 4.3.



Points to Remember

- For effective spirit products storage temperature and relative humidity should be consistently maintained in a range of 15-20⁰c and 50-70% respectively while keeping bottles upright, especially those sealed with cork.



Application of learning 4.3.

- Prepare a field visit and ask trainees to go to the vinegar and spirit production industry in their respective province and participate in storing, packaging and labelling spirits products.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Spirit products are appropriately packaged	1.1 Packaging materials are selected		
		1.2 Packaging materials are washed		
		1.3 Packaging materials sterilized		
		1.4 Packaging is done		
2	Spirits products are appropriately labelled.	2.1 Labelling information is indicated		
		2.2 Labelling is done		
3	Spirits products are properly stored.	3.1 Temperature is controlled		
		3.2 Relative humidity is controlled		
		3.3 Storage is arranged.		
4	Field visit report is done	4.1 Trainee identification is mentioned		
		4.2 Company identification is mentioned		
		4.3 Key competencies gained are described		
		4.4 Recommendation are mentioned		



Learning outcome 4 end assessment

Written assessment

1. Read the following statement and complete them by using correct terms in the brackets (Distillery, Methanol, Distillation, Vacuum distillation, Ethanol).

- a)is a process of separating ethanol from a fermented liquid by heating it to its boiling point and condensing the vapor.
- b)is a facility where distillation processes are used to produce highly concentrated alcoholic beverages.
- c)is referred as a distillation method by which pressure reduced within the distillation apparatus, which lowers the boiling points of the liquids being separated.
- d) is a toxic alcohol with a lower boiling point of 64.7°C.
- e) is the main desirable alcohol that boils at temperature between 78.37°C-78.5°C.

Answer:

- a) Distillation
- b) Distillery
- c) Vacuum distillation
- d) Methanol
- e) Ethanol

2. Read the following statement and Answer by true (T) if the statement is correct or false (F) if the statement is wrong.

- a) Flavoring agents for spirit derivative products can vary widely depending on the spirit derivative product type, customer preference and the desired flavor profile.
- b) Water is used in spirit production for dilution which is also called proofing down and softens the harshness of a spirit, making it smoother to drink.
- c) Filtration refers to the process of adding unwanted particles, impurities and contaminants to spirit derivative products.
- d) Retentate is the filtered liquid that passes through the membrane, which contains the clarified spirit product.
- e) Packaging in spirit production is the process of enclosing the spirit product in suitable packaging materials.

Answer:

- a) True
- b) True
- c) False
- d) false
- e) True

3. Read the following statement and answer by circling a letter corresponding to the correct answer.

- a) The following are purpose of packaging spirit products except.
 - i) Protection of spirit products
 - ii) Preventing exposure to air, light and other contaminants
 - iii) Information transmission
 - iv) Marketing and branding
 - v) None of above
- b) Which one is not selection criteria of packaging material for spirits products?
 - i) Barrier properties of Packaging material
 - ii) Strength and durability
 - iii) Sustainability to environment.
 - iv) Location of the distillery
 - v) Regulatory Compliance
- c) The following are Packaging material except.
 - i) Paper bag
 - ii) Plastic packaging material
 - iii) Aluminium can
 - iv) Glass packaging material
- d) Which one is sterilization method for packaging material
 - i) Cooling sterilization
 - ii) Steam sterilization
 - iii) Gas sterilization
 - iv) Oven sterilization

Answer:

- a) v
- b) iv
- c) i
- d) ii

4. Matching the statement in column A and column B and write the corresponding letter in the answer's column.

ANSWER	Column A	Column B
1.....	A. Applied labelling	i. is the first layer of packaging that directly contains the spirit.
2.....	B. Primary packaging	ii. is used to group primary packages together.
3.....	C. Direct labelling	iii. It is technique of labelling at which all information is pointed on the paper which is applied on the package.
4.....	D. Secondary packaging	iv. is technique of labelling at which all information is printed on the package.

5.....	E.	v. is the outermost layer of packaging that contain several secondary packaging for the distribution and transportation of products.
--------	----	--

Answer:

1. A iii
2. B i
3. C iv
4. D ii

Practical assessment

Enjoy Ltd is spirit processing industry, they need to make spirit from fermented pineapple mixture. Unfortunately, they do not have a technician for helping them in this production. The managing director requested you to make 2l of distilled bland with 40% of alcohol by volume. Spirit should be stored in glass bottle of 1l. The activity should be performed at Enjoy Ltd in 3 hour.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Fermented mixture is properly distilled according to the spirit specifications	Fermented liquid is selected		
		Distillation method is applied		
		Distillate composition separation temperature is respected		
2	Spirit quality is well analysed according to product specification	Ethanol level is analysed		
		Methanol level is analysed		
		Congeners level is analysed		
3	Spirit derivative products are well produced according to the product specification.	Blend is prepared		
		Spirit derivative product alcohol content is respected		
		Microfiltration is done		
		Sensory evaluation is done		
		Methanol level is detected		
4	Spirit products are appropriately packaged according to the product requirements	Packaging materials are selected		
		Packaging materials are washed		
		Packaging materials sterilized		
		Packaging is done		
5	Spirits products are appropriately labelled.	Labelling information is indicated		
		Labelling is done		
6	Spirits products are properly stored.	Temperature is controlled		
		Relative humidity is controlled		
		Storage is arranged.		



Further information to the trainer

Górak, A. &. (2014). Distillation: fundamentals and principles. . Academic Press.

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