
UNIT 5 FISH FLAKES, FISH SAUCE AND FISH SOUP POWDER

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5.0 OBJECTIVES

After reading this unit, you will be able to:

- explain the utilization of excess fish catch for producing convenience products like fish flakes;
- describe the preparation of fish sauce using low value fish; and
- discuss the production of fish soup powder, a high value item from low value fish.

5.1 INTRODUCTION

Utilization of surplus fish catch has been a problem for fishermen for centuries. In the past, during active fishing seasons, particularly during rainy seasons, most of the catches were allowed to spoil in the beaches, as there was no transport or preservation facility available. Fishermen developed many traditional technologies like sun drying, salt curing, sauce manufacture etc. with a view to utilizing the catch and also to use these during seasons when there is no fishing. Some of these technologies still continue to exist as the products are still relished by man. Dry fish production and sauce manufacture are two such technologies of great relevance even today. With modernization, more products started to appear in the market. Fish soup powder and fish flakes are two such products with great consumer acceptance. In this unit, production of these value added products are discussed in detail.

5.2 FISH FLAKES/WAFERS

Fish flakes are known by different names in Asian countries. In India, they are called wafers, crackers or flakes. In Malaysia, they are called *keropok*.

Flakes are of different types. Some are made hot by incorporating chillies. In other types, they are treated with sugar prior to frying. In fact, a number of flavours can be incorporated with flakes. There are garlic, masala and other vegetable flavours incorporated flakes also. They are sold either as unfried or fried forms. Freshly prepared flakes when fried in vegetable oil maintained around 170°C swell two to three times of their initial volume. They become crisp and delicious to eat.

5.2.1 Raw Materials

Types of fish that can be used for making flake are given below:

- Jew fish (*Sciaenids spp.*)
- Croaker (*Sciaena caucus*)
- Perches
- Tilapia
- Kilimin (Threadfin bream)

You should remember that any fish, fresh water or marine, having good flesh can be used to prepare fish flake i.e. low value fish or fish mince.

5.2.2 Equipments Needed

- Meat bone separator
- Cooking vessels
- Wet grinder or cutter
- Cooking chamber (Steam chamber)
- Aluminum trays
- Hot air drier

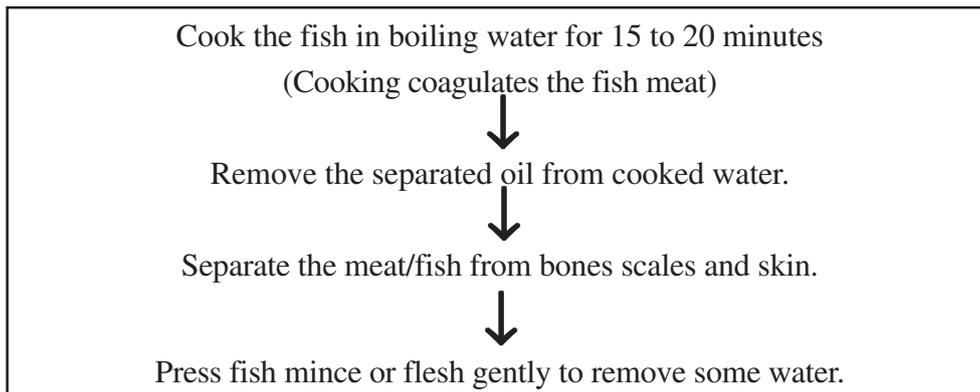
5.2.3 Recipe

General recipe for fish flake is given in Table 5.1.

Table. 5.1: Recipe for Fish Flakes

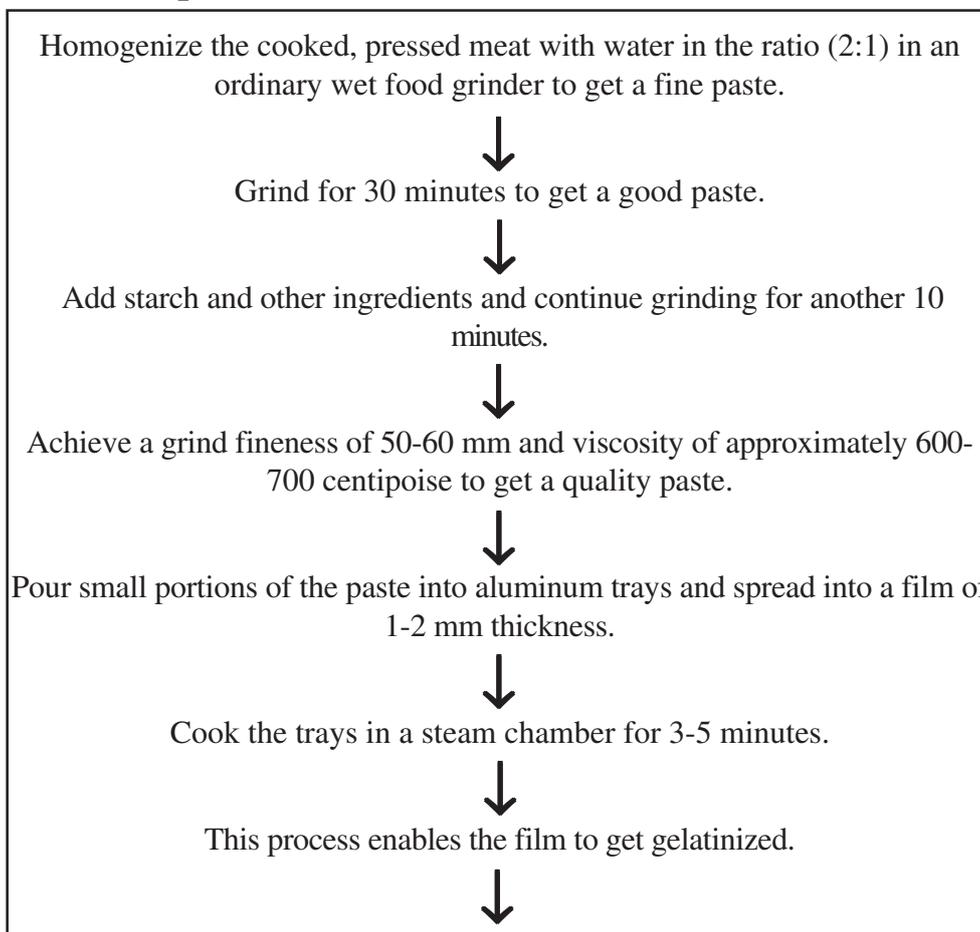
Ingredients	Composition by Weight
Cooked fish meat	2
Corn flour	1
Tapioca starch	2
Common Salt (NaCl)	0.05
Water	3.5
Total	8.55

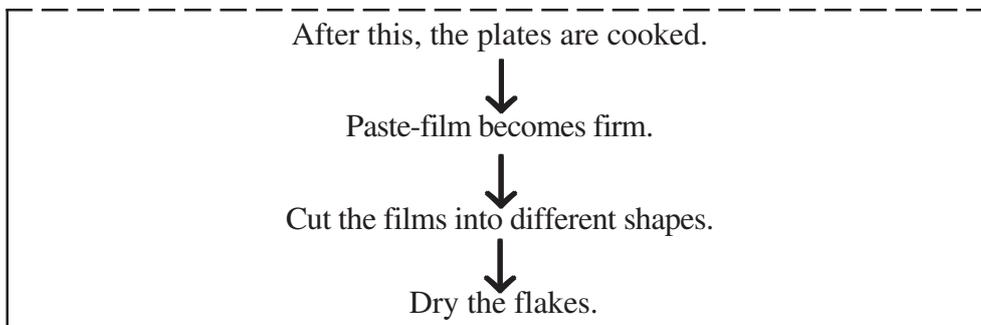
5.2.4 Preparation of Cooked Fish Meat



While using fish mince, this process becomes easy. The mince can be directly used for cooking. The cooked meat is now ready for use.

5.2.5 Preparation of Flakes





Flakes can be dried under sun. This is the ideal method in tropical countries. However, sun drying is not possible in rainy season. Also one needs large area for drying and fly proof roofing also. In modern times, the whole process is automatically done. The paste is poured in trays, spread by roller and cooked by passing through in a steam chamber through a conveyer. The gelatinized film is cut mechanically and passes through a hot air tuner drier, maintained around 60°C. The dried flakes are packed automatically.

There are different types of flake manufacturing machines. The process has become simple and large-scale production can be attained in a short time. But, flake making is still popularly done manually in many Asian countries like India. This industry is labour oriented and finds application in employment generation by establishing cottage industries.

Packing

The flakes are packed in polyester/polypropylene bags or co-extruded HDPE/LDPE packets (Fig. 5.1)

Storage life of the product is 2 years.



Fig. 5.1: Fish Flakes

5.2.6 Proximate Composition of Fish Flakes

Proximate composition of Fish flakes is given in Table 5.2.

Table 5.2: Proximate Composition of Fish Flakes

Components	Percentage (Range)
Moisture	5-6
Protein	10-12
Ash	5-7
Fat	1-2
Carbohydrate	73-79

5.2.7 Recipe for Crab Wafers

Details of ingredients, for the preparation of crab wafers are given in Table 5.3.

Table 5.3: Ingredients for Crab Wafers

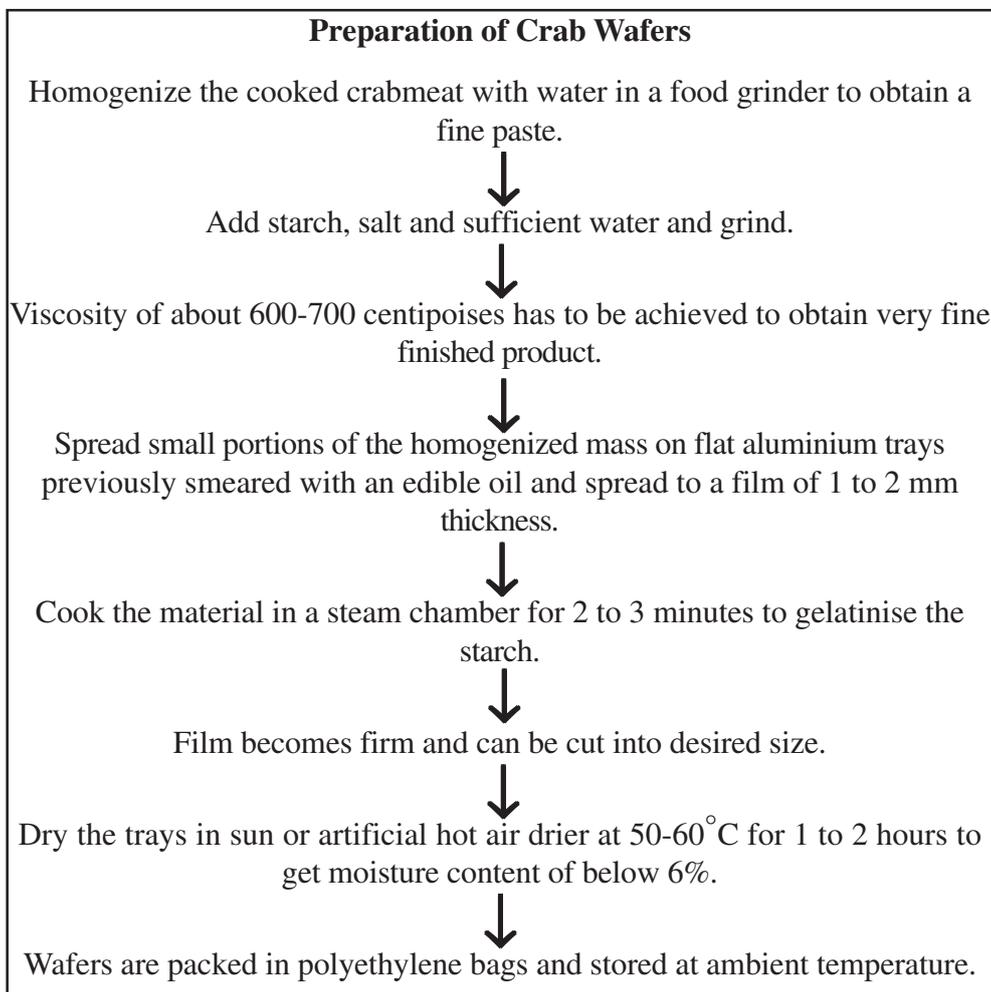
Ingredients	Composition (wt. in g)
Cooked Crabmeat	500
Tapioca Starch	500
Corn Starch	250
Sodium Chloride	20

(Venugopalan and Govindan, 1967)



Fig. 5.2: Two varieties of crabs

You know that crab (Fig.5.2) meat is very popular with consumers now-a-days. For your knowledge, the preparation of crab wafers is explained below:



5.2.8 Recipe for Tuna Wafers

Tuna is an oceanic fish abundantly caught around Lakshadweep islands (Fig.5.3)



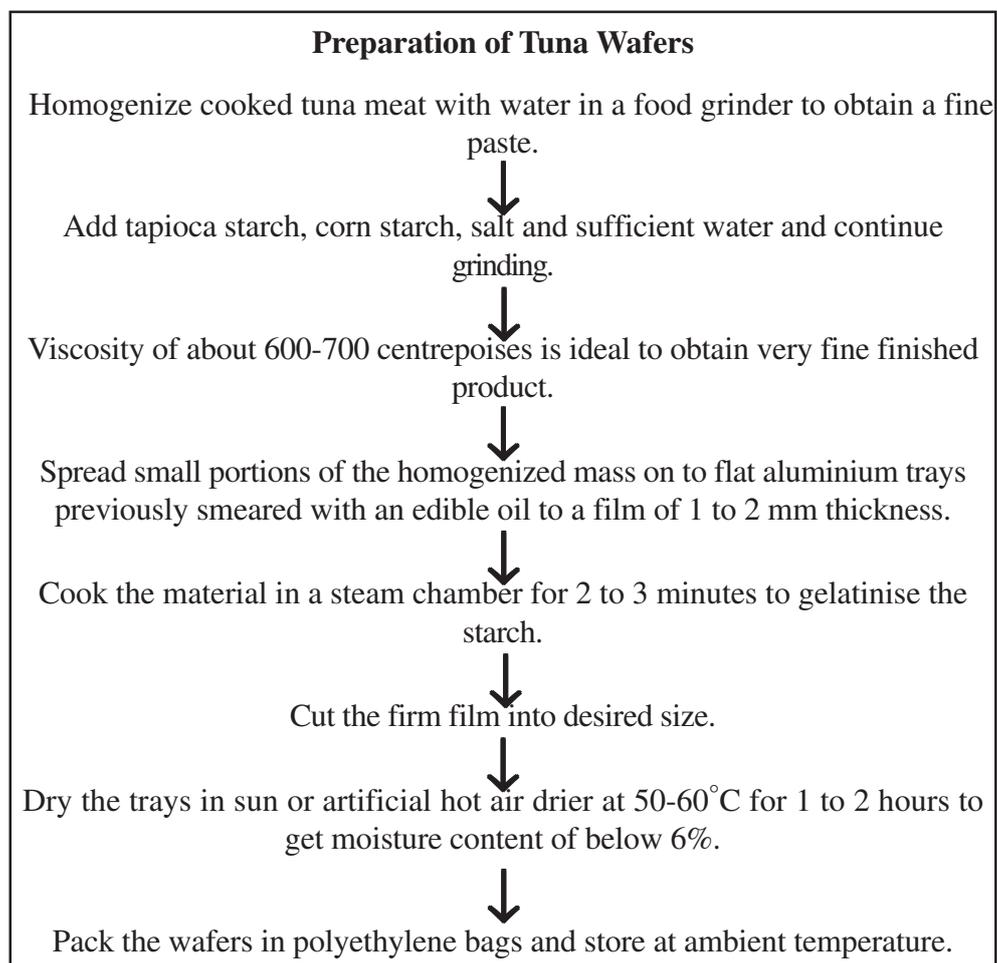
Fig.5.3: Tuna

Ingredients for tuna wafers are given in Table 5.4

Table 5.4: Ingredients for Tuna Wafers

Ingredients	Composition (wt. in g)
Cooked tuna meat	500
Tapioca starch	500
Corn starch	250
Salt	20
Water	As needed

(Thankappan et.al 1998)





Check Your Progress 1

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) Names of fish species those can be used for the manufacture of fish flakes?

.....

2) What do they call fish flake in Malaysia?

.....

3) What are the ingredients needed to produce fish flakes?

.....

5.3 FISH SAUCE

Fish sauce is a fermented product. Fish sauce is a very popular product in all south East Asian countries like Thailand, Malaysia, China, Vietnam and Philippines. Fish sauce is not a popular item in India.

Fish sauce is known by different names in many Asian Countries.

Country	Fish Sauce	Country	Fish Sauce
China	: Yu-lu	Indonesia	: Ketgap-ikani
Japan	: Shott suru	Vietnam	: Nuoc mam
Kampuchea	: Nuoc mam	Korea	: Jeot kuk
Malaysia	: Budu	Philippines	: Patis
Thailand	: Nam-pla	Hong Kong	: Fish Sauce

5.3.1 Process/Definition

The CODEX Committee on Fish and Fishery Products has defined fish sauce as *“a clear liquid product with salty taste and mild fish flavour obtained from natural fermentation of a mixture of fish and salt”*. (CX/FFP 08/29/9).

The product is prepared by mixing fish, water and salt and kept in covered containers or tanks. The fermentation of the mixture is left at ambient temperature for a period not less than 6 months and the liquid is obtained as a result of protein hydrolysis. Optional ingredients (e.g. sucrose or caramel colour) may be added to the final product.

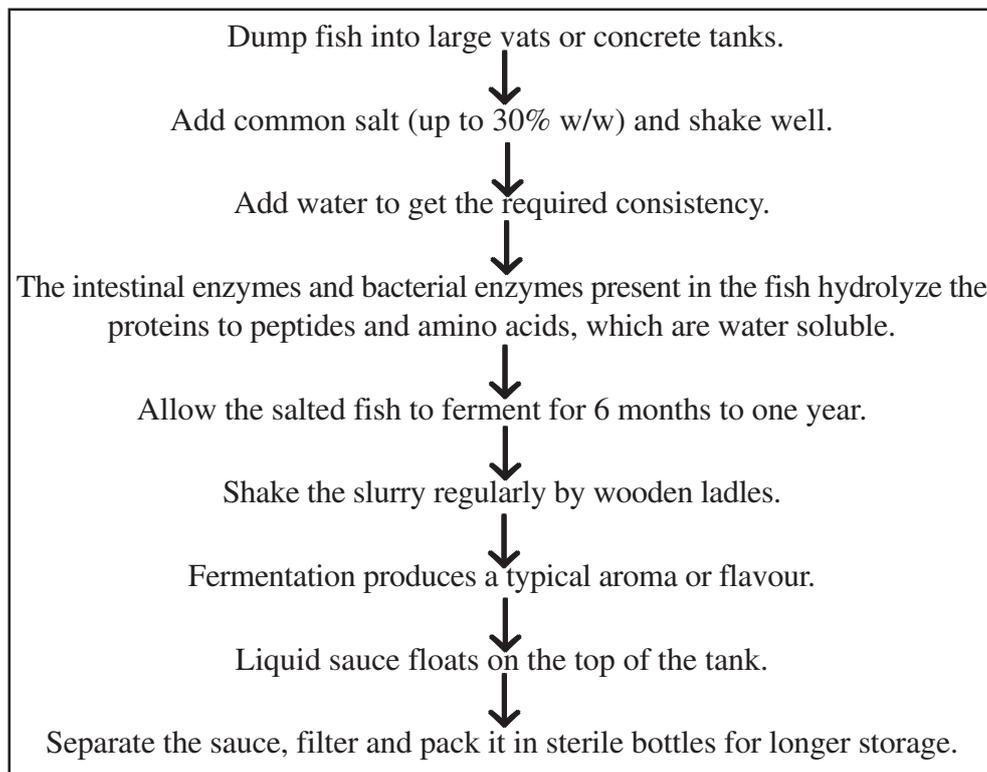
Materials Required:

1. Good quality edible fish preferably non-fatty

- 2) Salt (NaCl), food grade
- 3) Other ingredients, food grade
- 4) Additives shall comply with the Codex General Standard for Food Additives (CODEX STAN 192-2007).

5.3.2 Production (General Method)

Fish sauce is the most important fermented fishery product in all Asian countries. Salt is the main constituent other than fish.



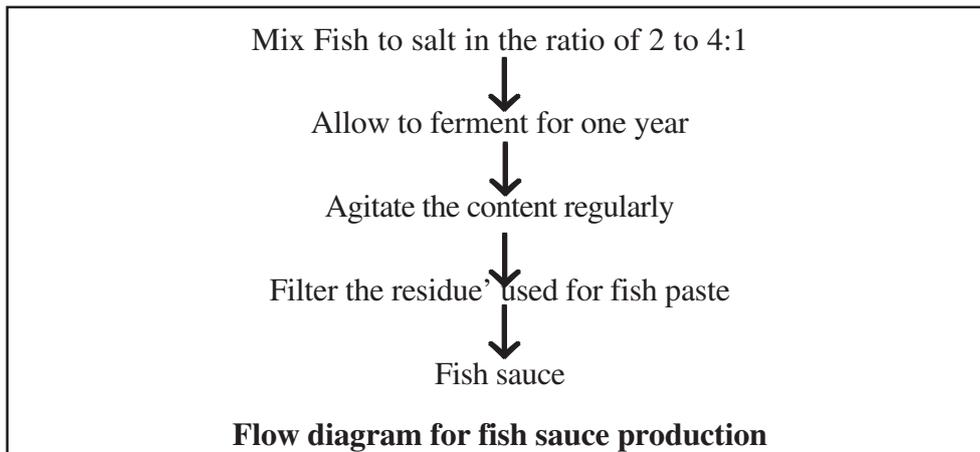
One advantage of sauce production is that fish of all types and slightly spoiled ones can also be used for sauce making. The production is popularly done in glut season when large quantity is landed. It is one of the best ways of preserving fish. Ageing is an important step in sauce production. This aroma differs from species to species. Fish sauce produced from *Anchovy* (Fig.5.4) is the best accepted one. It has a golden colour. Once the process of fermentation is over, Sterilization is not an essential step needed. The fermented sauce contains a lot of aromatic flavor compounds and antimicrobial molecules and these help the product to get a typical flavour and long shelf life.



Fig. 5.4: Anchovy

You will be surprised to know that fish sauce production is a huge commercial venture in all Asian Countries. Fish sauce is exported to USA and Europe also. Sauce production is now a flourishing industry in Thailand, Vietnam and Philippines. It is a highly salty product and has severe health hazards for people who have

health problem like high blood pressure (hypertension), kidney and cardiac diseases. In Southeast Asian countries, sauce is invariably added to all cooked foods to impart fishy flavour and salt taste. A general flow diagram of fish sauce production is given below:



(Ref: Gopakumar, *Tropical Fishery Products*, OXFORD and IBH Publishing, New Delhi-110001, 1997)

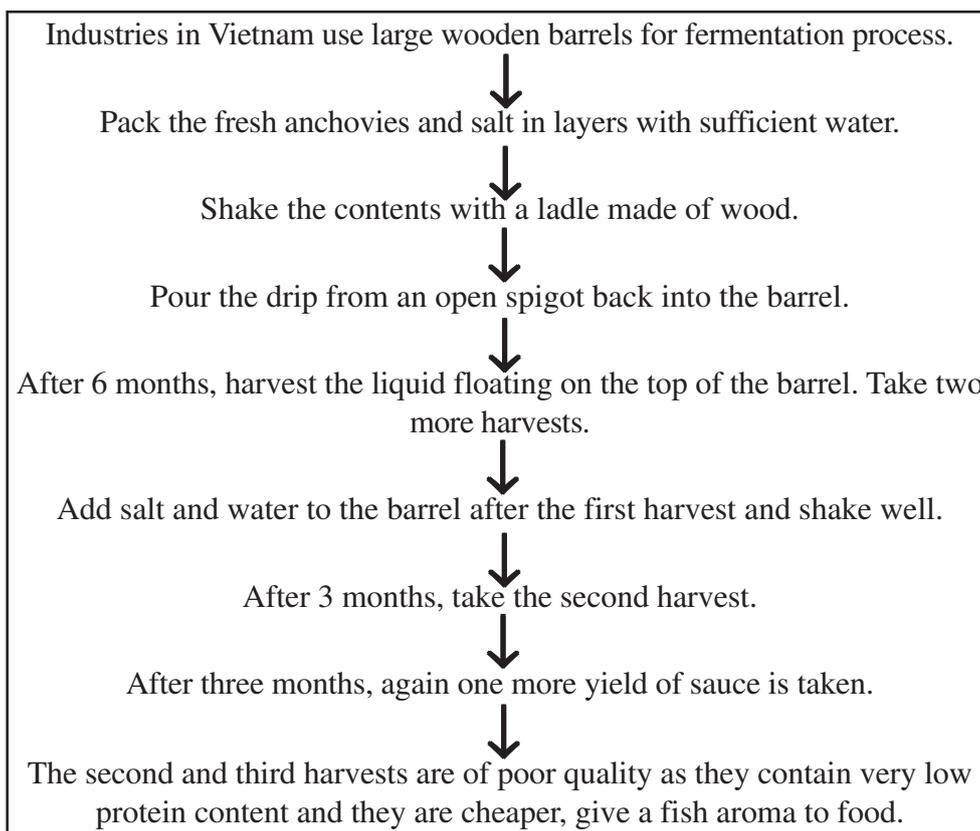
5.3.3 Specialized Sauces

Sauces differ in countries. The specialized sauces are described below:

a) Nuoc mam (Vietnam)

In most South East Asian countries like Thailand, Cambodia, Philippines, Vietnam etc., addition of sauce to cooked food is same as to addition of salt in other countries. Fish sauce is added to all recipes of food. Among the species of fish used to prepare sauce, anchovies are the most preferred. Sauce from anchovies is the highly priced commercially. It is light brown in colour with an appealing aroma.

Process



In Vietnam, two towns well known for sauce production are Phu Quoc and Phan Thiet. Almost all sauce production centres are located near seashore. Sauce production is practiced in fishing seasons only. The technology of sauce production was invented by man centuries ago to preserve the surplus catch in glut seasons for future use when fish is scarce. In fact, this technology is the cheapest and best way of utilizing the surplus fish when large landings are obtained. These companies also export large quantities of fish sauce to Europe and America.

Vietnam also exports large quantities of sauce and the best carries a tag called “*Nhi*” meaning the highest quality (Table 5.5). Another symbol seen in some sauce bottle is “*Ca com*” meaning that it is prepared from anchovies only and is best for table use.

Table 5.5: Quality Criteria for a Good Sauce

Appearance	Salt should be clear and no sediments except salt.
Odour and taste	Typical fish odour and taste of sauce
Foreign matter	Free from any foreign matter
Total nitrogen	Not less than 10g/l
Amino acid nitrogen	Not less than 40% of total nitrogen
pH	Should be between pH 5 and 6

In addition to the above quality criteria (Table 5.5), if any food additives are added they should comply with quality standards for Food Additives as laid down by CODEX (STAN 192-2007).

b) Nam-Pla (Thailand)

Thailand, one of the largest producer and exporter of fish sauce (Nam –Pla) has made important quality standards for sauce produced in Thailand (Notification of the Ministry of Public Health, No. 203, BE, 2543, 200, Unofficial). In Thailand, two agencies drafted standards (Table 5.6) they are:

- 1) Food and Drug Administration (FDA) of Thailand, Ministry of Public Health (Table 5.6).
- 2) Thai Industrial Standard Institute (TISI), Ministry of Industry.

Table 5.6: Thai FDA standard for Nam-Pla

Requirements	Natural Pure Fish Sauce
NaCl (g/l)	NLT 200
Total Nitrogen (g/l)	NLT x 9
Amino Acid Nitrogen (% total Nitrogen)	40-60
Glutamic Acid Nitrogen/Total Nitrogen	0.4-0.6
Clarity	Clear, no precipitate unless naturally occurring and must be less than 0.1g/litre
Sweetening Agents	Not allowed except sugar
Colour	Not allowed except caramel

NLT: not less than



Check Your Progress 2

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) Outline two important quality criteria prescribed for a good fish sauce?

.....
.....

2) What is the definition of fish sauce?

.....
.....

3) What are the materials used in fish sauce?

.....
.....

4) What is the important step in sauce production?

.....
.....



Activity 1

Visit a local fish market. Buy some fresh low-cost fish. Try to make fish mince as per the procedure described in this unit. Try to prepare some fish wafers. Ask some of your friends to taste the product and give their opinion.

.....
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.....

5.4 FISH SOUP POWDER

You know that soup has long been accepted as a delicacy by people all over the world. Today, varieties of soups are available in ready-to-use form and packed in laminated pouches. Any low value fish can be converted to fish soup. However, bony small fishes are not suited for making soup.

Types of fish that can be used for making soup are given below:

- Jew fish (*Sciaenids spp.*)
- Croaker (*Sciaena caucus*)
- Perches
- Tilapia
- Kilimin (Threadfin bream)

You should remember that any fish, fresh water or marine, having good flesh can be used to prepare fish soup powder i.e. low value fish or fish mince. Fatty fishes like sardines or mackerel are not used as the soup becomes rancid very fast and hence only have limited shelf life.

5.4.1 Equipment

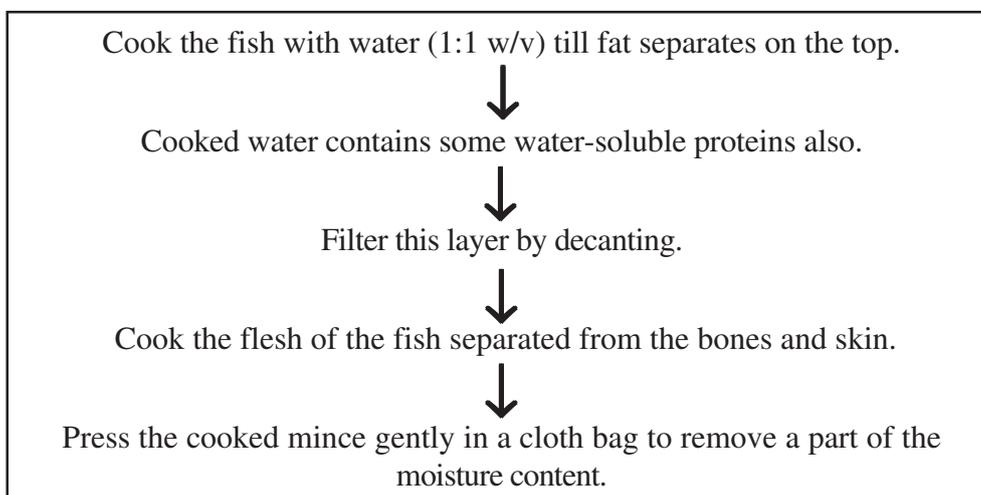
- Meat bone separator
- Vessels for cooking fish
- Wet grinder
- Perforated aluminum trays
- Air drier

5.4.2 Recipe

Ingredients	Composition (wt. in g)
Cooked fish meat/minced	750
Chopped onions	750
Salt (NaCl)	170
Vegetable oil/Hydrogenated fat	125
Coriander powder	12
Tapioca/corn starch	250
Milk powder	10
Vitamin C	1.5
Carboxy methyl cellulose (CMC)	3
Pepper powder	15
Garlic powder	3

5.4.3 Procedure

a) Preparation of Cooked Fish Meat



b) Preparation of fish soup powder

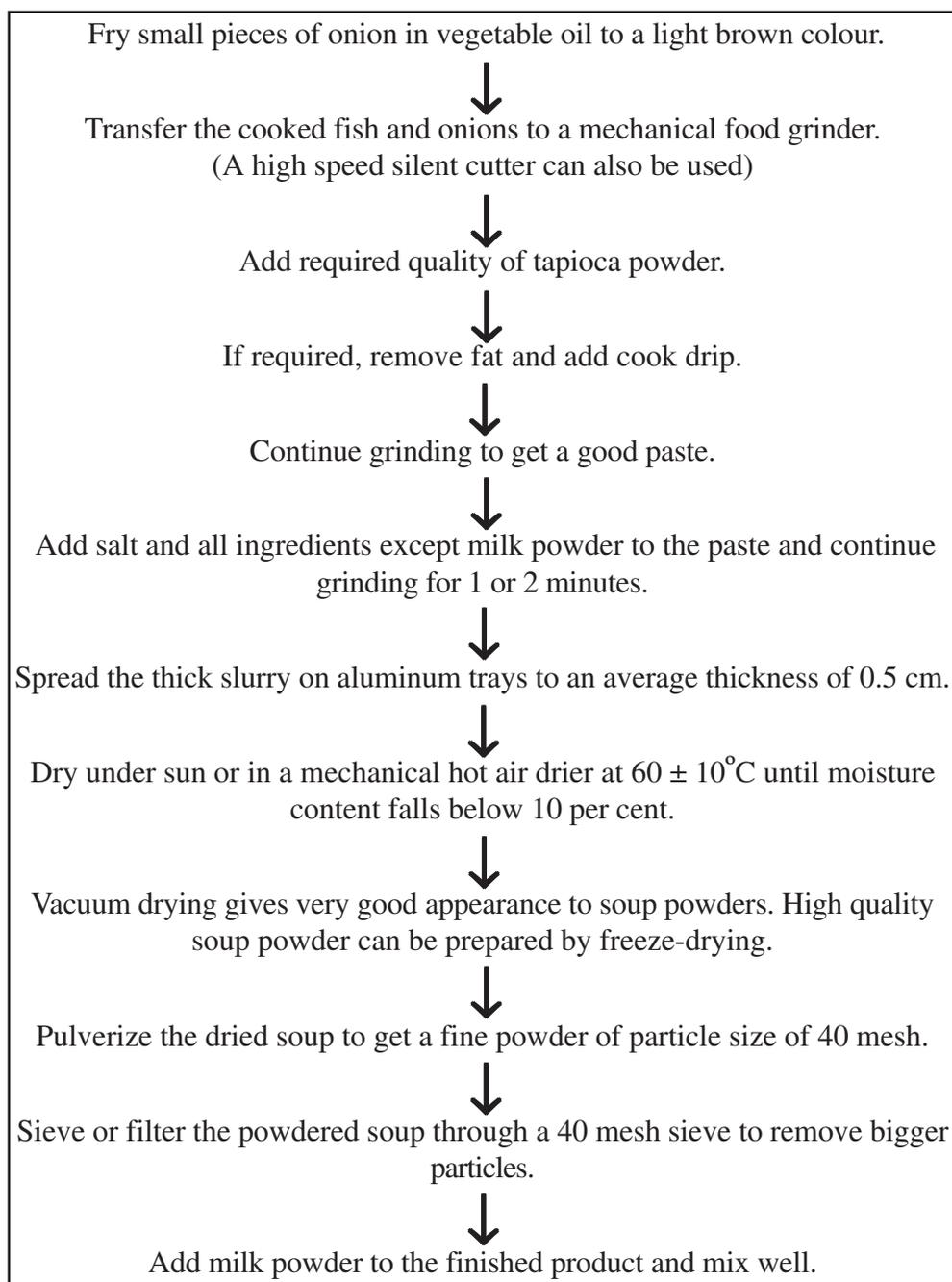
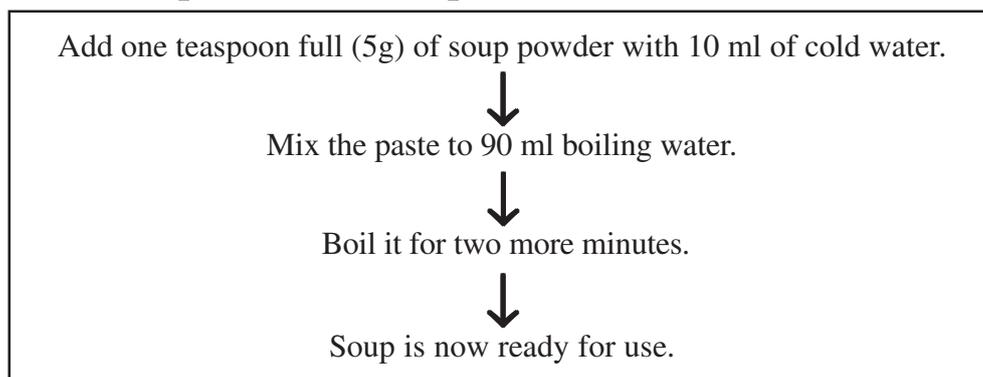


Table 5.7: Proximate Composition of Fish Soup Powder

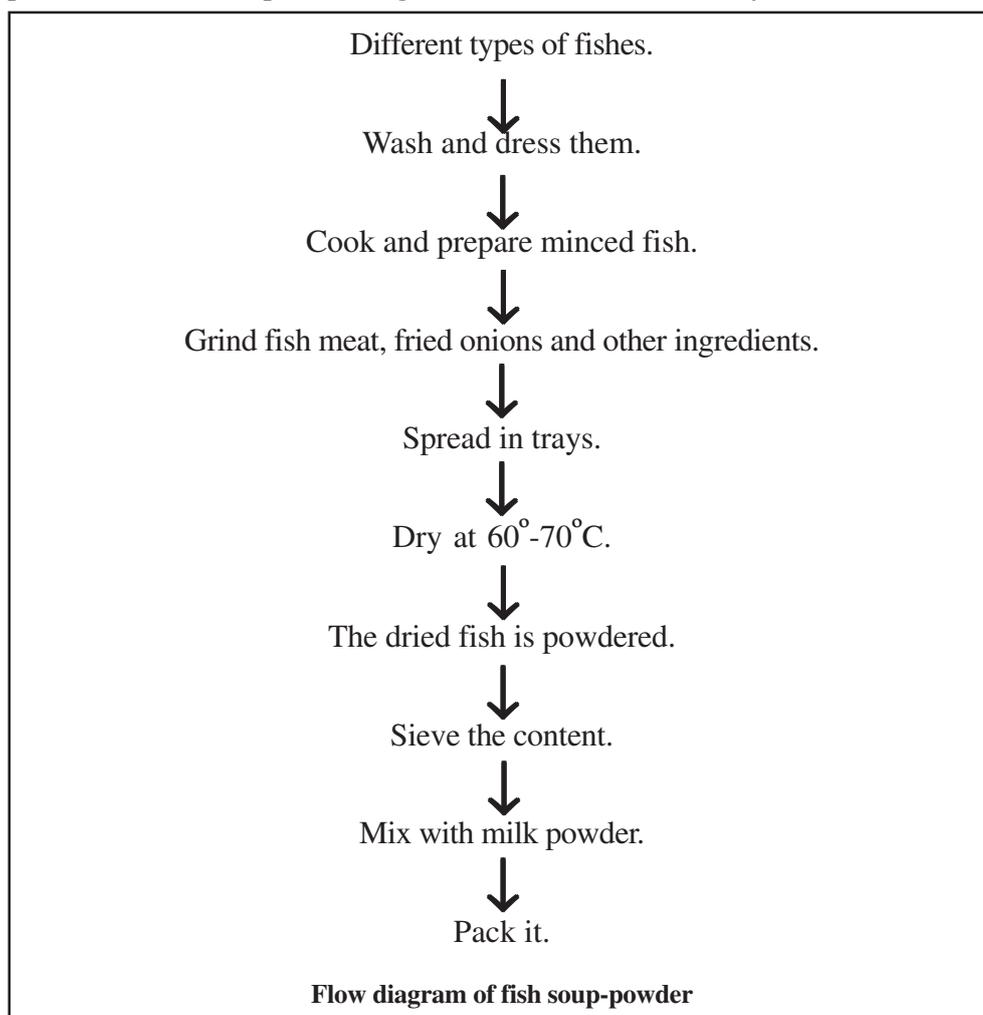
Constituents	Quantity g/100g Soup Powder
Moisture	5.09
Ash	19.21
Protein	21.10
Fat	14.60
Carbohydrate	40.00

5.4.4 Preparation of Soup



5.4.5 Packing

Fish soup powder contains partially hydrolyzed proteins, carbohydrates, fat and several seasoning compounds including salt and is hygroscopic in nature. Proper packaging of this product assumes great importance in view of its hygroscopic character. Work in CIFT has revealed that 12 micron plain polyester laminated with LDPE-HDPE co-extruded film or 90-100 micron LD / BA / Nylon / BA Primacore multi layer, film to be suitable for storage of soup powder for long term storage up to 180 days (P.V.Prabhu and T.K. Srinivasa Gopal, 1998). Soup powder can also be packed in glass bottles. Shelf life is 2 years.



5.4.6 Recipe for Crab Soup Powder

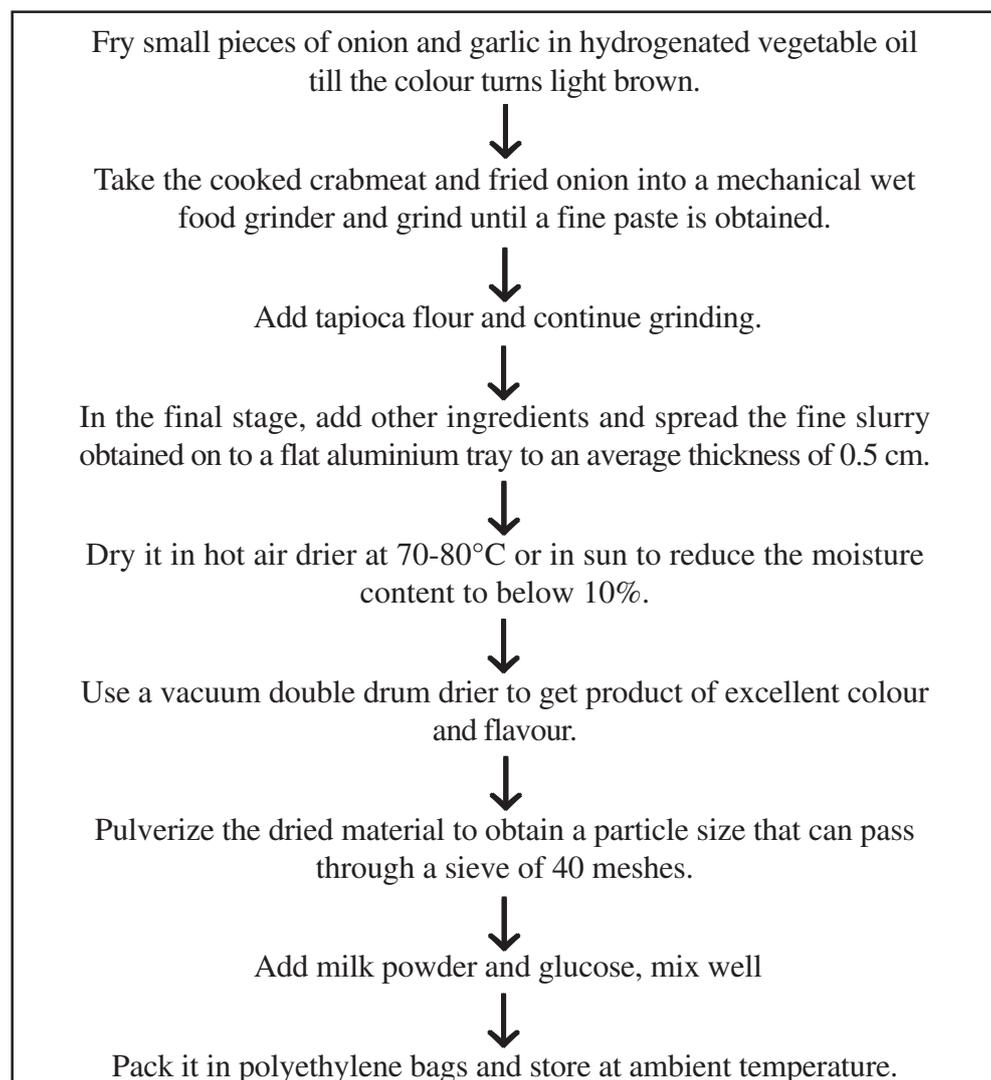
Crabmeat is low fat, medium protein seafood with high amount of phosphorus. The recipe for crab soup powder is given below:

Recipe for crab soup powder

(Chinnamma George et.al, 1998)

Ingredients	Composition
Cooked crab meat	500g
Tapioca Flour	66g
Milk powder	66g
Sucrose / glucose	15g
Fat (hydrogenated vegetable oil)	66g
Onion	500g
Salt	113g
Coriander	12g
Pepper	12g
Garlic	4g
Monosodium glutamate	7g
Carboxymethyl cellulose Ascorbic acid	2g
Ascorbic acid	1g

Preparation





Check Your Progress 3

Note: a) Use the space given below for your answers.

b) Check your answer with those given at the end of the unit.

1) The protein and fat content of fish soup are.....

2) Name three species of fish used for making fish soup powder?

.....
.....

3) Name the containers used for packing soup powder?

.....
.....

4) How is fish soup prepared?

.....
.....

5.5 LET US SUM UP

A large variety of different fish protein hydrolysates are being produced. The oldest is fish sauce which has long tradition in South East Asia. Fish sauce, which is the major fermented fish product was known in ancient Greece and Rome. Fish sauce is produced in a quantity of about 2,50,000 tonnes per year. As you know, fish sauce is made by mixing three parts of fish raw material with one part of salt and then storing at ambient tropical temperature for 6 to 12 months. Both endogenous and microbial enzymes contribute to the degradation of the protein in the fish and the resulting fish sauce is an amber liquid with 8 to 14 % digested protein and about 25% salt. Fish soup powder, fish sauce and fish flakes can be prepared from low value fish. These products add value to cheap fish. They are nutritionally rich in proteins, minerals and fat. These products can be prepared commercially and can generate income to fisher folk. Fried fish flakes are delicious snacks. These technologies can prevent post harvest losses and are excellent methods to utilize the surplus fish in glut seasons.

5.6 GLOSSARY

Antimicrobials	: Chemicals those kills bacteria.
Coagulates	: Gets separated into a thick mass.
Food Additives	: Compounds added to a food formulation to enhance its quality.
Ingredients	: Components forming a recipe.
Pulverizer	: Powdering machine.
Proximate	: The total percentage of different nutrients in the food.
Surplus	: Excess.



5.7 SUGGESTED FURTHER READING

Gopakumar, K. 1997. *Tropical Fishery Products*, Oxford & IBH Publishing Company, New Delhi.

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5.8 REFERENCES

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Takahashi. 1974. *Utilization of Squid as Food*. In: *Fishery Products* (Ed. Rudolf Kreuzer), Published by FAO of United Nations, pp. 244 to 247.

Thankappan, T.K., George, C. and Ramachandran Nair, K.G. 1998. *Utilization of Tuna and Tuna Waste*. In: *Technological Advancements in Fisheries* (Eds. Hameed, S.M. and Kurup, M.B.) Published by Cochin University of Science and Technology, pp.329 to 334.

5.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Jew fish, perches, Tilapia, Kilimeen.
- 2) Keropok.
- 3) Cooked fish meat, corn flour, tapioca starch, common salt and water.

Check Your Progress 2

- 1) Appearance and odour.
- 2) A clear liquid product with salty taste and mild fish flavour obtained from natural fermentation of a mixture of fish and salt.
- 3) Fish, salt (food grade) and other food grade ingredients.
- 4) Ageing.

Check Your Progress 3

- 1) The composition of protein is 21.10 g/ 100g and fat 14.60 g /100g.
- 2) Tilapia, jew fish, croaker.
- 3) Glass bottles, laminated paper packs, Co-extruded HDPE/LDPE pouches.
- 4) One teaspoon (5g) of soup powder is made into a paste with 10 ml cold water. The paste is added to 90 ml boiling water. Continue boiling for two more minutes.