

CANNED PRODUCTS HERMETICALLY SEALED BUT NOT PROCESSED

A number of products are packed in hermetically sealed glass or tin containers under vacuum which have not been "sterilized" or "processed" by heat, but which are generally included among canned products. Preservation of these products is possible only for limited periods, which may be sharply reduced by unfavorable conditions of storage and handling. These products depend for preservation on the curing to which they are subjected previous to packing and on subsequent storage at low temperatures. The tin or glass container simply serves as a method of packaging, superior to containers previously used, and has very little or no preservative effect. It is not possible under present methods to preserve some of these products for longer periods by using a heat process. For example spiced herring are made tough and fibrous in texture, unpleasant in flavor and discolored by cooking or processing. Products such as oysters, crab and shrimp meat can be and are processed, but when they are sold unprocessed in hermetically sealed containers it is because the market for which they are intended demands the flavor of the "fresh" product.

ANCHOVIES

Two types of anchovies are packed, Spanish or Italian anchovies, and the Norwegian or Swedish anchovies. The former are true anchovies, while the second variety is made from the brisling or sprat. The methods of cure also differ. Since few anchovies are cured locally, those packaged in this country are imported, usually in wooden kegs holding about 100 pounds each. They are repacked in glass and tin containers holding from 1 to 8 ounces. Apparently more glass than tin containers are used for this purpose in the United States. Most anchovies imported in individual containers are packed in tin. Imported cans are not standardized, many odd-sized containers being used. Most of these are "flat" or "square" pressed tins of the type used for sardines or kipper snacks.

SPANISH OR ITALIAN ANCHOVIES

Spanish or Italian anchovies are cured by a process which depends on fermentation to give the product the desired flavor. Curing varies in details among different packers, but the following method is representative: Fresh anchovies are gutted and

headed by twisting the heads off, the workers using their fingers. The visceral material is removed, attached to the heads. The fish are then salted down in large hogsheads or vats, using 40 to 50 pounds of salt to 100 pounds of fish. The hogsheads are left standing in the sun, or the vats are subjected to a temperature of 80 to 90° F. for several hours each day. At the end of 3 or 4 months, fermentation should have progressed so that the flesh assumes a red color and acquires the desired flavor. The fish are then removed from the brine and pressed to remove excess moisture and oil.

In some instances the anchovies are cured in tanks for about 3 months with 50 pounds of salt per 100 pounds of fish. After this they are taken from the heavy brine and resalted in hogsheads with 25 pounds of salt per 100 pounds of fish. The hogsheads are left in the sun until the anchovies have acquired the desired color and flavor. Ocher may be added to the brine to improve the color.

NORWEGIAN OR SWEDISH ANCHOVIES

Norwegian or Swedish anchovies are flavored with salt and spices and the curing is not a fermentation process. Various spice mixtures are used but the following process is typical. From 25 to 30 pounds of sprats are placed in a brine made of 4½ pounds of Liverpool salt and enough water to cover, for 12 hours, and are then laid on a screen to drain. The following quantities of spices are used: 2¼ pounds of Luneberg salt, 3 ounces of pepper, 3 ounces of allspice, ½ ounce of cloves, ½ ounce of nutmeg and ½ ounce of cayenne pepper. All are well pulverized or ground and mixed together. The sprats are well stirred up with half of these spices in a large container in which they are packed and left for 14 days. They are then packed in layers, backs down. Some of the remaining spice mixture is scattered between each layer, with pieces of chopped bay and cherry leaves. On the bottom and on the top of the containers two whole bay leaves are laid. The brine formed in the larger container is used to fill in the smaller containers after packing. During the first few days after the containers are closed they must be rolled about and inverted at least every other day (Hoffman, N. D.).

Tin containers are preferred to wooden kegs not only because the latter are often leaky, but also because the airtight seal in the former permits a longer period of preservation.

According to another formula fresh brisling are placed for 12 to 24 hours in a strong salt brine, drained and dried on a screen, and are packed in layers in small kegs. To each 40 pounds of fish, 2¼ pounds of Luneberg salt, 7 ounces of pepper, 7 ounces of allspice, 7 ounces of sugar, 1⅛ ounces of cloves, 1⅛ ounces of

nutmeg, and $1\frac{1}{8}$ ounces of Spanish hops are added. The spices are coarsely pulverized and mixed with the salt. At the top, bottom and in the middle of the keg, several bay leaves are laid. The kegs are packed very tightly and rolled about or inverted daily for 14 days. The anchovies may be repacked in tins in 14 days in summer, or 4 to 8 weeks in winter.

CODFISH

Fresh or canned fish cannot be substituted with complete satisfaction in certain favorite dishes where salt cod has always been used. But the modern grocer hesitates to handle salt cod because the distinctive odor which develops after curing, under ordinary conditions of handling, will drive customers away. Furthermore the deterioration, together with the drying, yellowing and crystallization of salt on the surface, which occur while the cod is being held for sale, lowers the quality and decreases the margin of profit.

The use of hermetically sealed vacuum pack containers removes the odor objection and results in salt codfish reaching the retail market with the flavor, color, texture and moisture content of freshly cured fish. No "sterilization" process is used, therefore the period of preservation is limited. This method was first used commercially on the Pacific Coast, but has also been introduced in the New England salt fish industry.

Freshly cured salt cod is graded for quality, only the best grade of fish being used. The selected fish is skinned, boned, and cut in container length pieces. At the filling table workmen weigh out the salt fish in one-pound lots, passing it to packers who form it into cylinders. Each cylinder is rolled in a sheet of vegetable parchment paper, the ends of paper are folded over to make a neat package, which is filled into a No. 1 tall can, with "C" enamel lining, seafood formula. The filled cans are sealed under vacuum, usually not more than 12 inches. The sealed cans do not require washing, though they may be wiped with a cloth. After labeling, 1 dozen cans are packed to a fiberboard carton.

Another hermetically sealed vacuum pack salt codfish is shredded cod. This is made by taking small pieces of good quality fish, mostly trimmings from packaging salt cod. These bits are shredded by machine, then filled into glass containers of the "tumbler" type with a capacity of 4 ounces net weight. The containers are fitted with metal tops and sealed in a vacuum closing machine. This product should not be placed in a strong light or oxidation and loss of flavor will occur. It is used principally for making codfish cakes.

SMOKED HERRING

A small but increasing amount of skinned and boned herring is packed in hermetically sealed containers every year, selling principally to the delicatessen trade where it is sold as an hors d'oeuvre or "cocktail relish." This pack is made in Maine from herring cured in that State or imported from Nova Scotia.

The method used in smoking "hard cured" herring is described fully by Tressler (1923) and Stevenson (1898). The herring are cured a minimum of four weeks to a moisture content of 5 per cent. Temperatures higher than 80° F. should not be used and many smokers prefer a temperature of about 62° F.

Boning and skinning the smoked herring may be done at the smoke house, or it may be "farmed out" on a piece work basis in nearby homes. The heads, bellies and tails are clipped off with scissors or removed by knives, the viscera are pulled out and the herring split in half. Workers, usually women and children, remove skin and bones with their fingers. The skinned and boned fish are cut in strips about 1/4 inch in width and are packed vertically in vacuum sealed glass tumblers, to a net weight of about 4 ounces. Like the shredded cod packed in glass, the jars are liable to oxidation if left in a strong light. This product is not processed but has been cured to a degree where preservation is almost unlimited under favorable storage conditions.

SMOKED SALMON

Mild-cured chinook salmon is used in the majority of instances for the preparation of canned smoked salmon, although some fresh salmon, lightly salted, is used in Norway, and some mild-cured pink salmon in Japan.

In preparing smoked salmon from mild-cured fish, the sides of salmon are taken out of the tierce and soaked overnight in a tank of fresh water, changing the water 2 or 3 times. When properly freshened the salmon are washed with a stiff bristle brush, to remove all traces of blood, slime, or encrusted salt.

The salmon are often drained by "water-horsing," that is, they are placed in a pile, flesh side down, while weights are placed on top of the heap to further increase the pressure and expel the excess water. After draining, the sides are trimmed of any ragged edges and wheeled to the smokehouse.

Salmon smoked for canning is given a "hard cure," requiring much more time than the usual method. After the smokehouse has been filled, a fire is started in the pit below and for some hours the fish is smoked over a clear fire with the ventilators of the

smokehouse open so that the moisture will escape. Otherwise the humidity would be increased to such a point that it would collect on the fish, causing them to "sweat."

The ventilators in the top of the smokehouse are closed and the fire is smothered with sawdust when there are no indications of surface moisture, and the sides of salmon have a thin glistening film or pellicle, or at the end of about 48 hours, and a dense smoke is created in which the salmon are cured for an additional period of 3 to 7 days.

The length of the smoking period varies with the locality, type and size of smokehouse, temperature used in smoking, humidity and outside temperature. Exact data as to smoking temperatures giving the best results are also lacking. As a rule the temperature should not exceed 80° F. and in general should be slightly lower. If too much heat is given off by the fire, the product will be partially cooked, will soon spoil and will not have the desired texture.

Alder wood is used in smoking salmon on the Pacific Coast, but almost any non-resinous wood such as maple or beech gives satisfactory results. Oak and hickory are favorite fuels among salmon smokers in the Atlantic Coast area of the United States. European packers of canned smoked salmon generally use beech or oak.

When the cure is completed, the smokehouse doors and ventilators are opened. After the smoked sides are sufficiently cool, they are skinned and cut in transverse slices showing as much as possible of the striations of the flakes of flesh, making a very attractive appearance. The slices are thin, averaging about 40 to the pound. While salmon has been sliced by hand until recently, automatic slicing machines have been found more efficient.

Hand packers fill the strips of sliced salmon into "quarter oil" cans to a net weight of $3\frac{3}{4}$ or 4 ounces. A small quantity of olive oil is added to each can. The filled containers are then sent through can closing machines which may or may not be of the vacuum sealing type. The hermetically sealed cans are cleaned, labeled and packed in cartons for shipment. No "cook" or "process" is given.

While this product is not as perishable as ordinary smoked salmon, it will not "keep" indefinitely and should not be exposed to unfavorable storage conditions. The maximum preservation period is secured by storage in refrigerated show cases. Occasionally a European packer will add hexymethylamintetramin (urotropin) as a preservative. The use of this preservative is not permitted under the regulations of the U. S. Food and Drug Administration, or in most other countries. Chemical preservatives of the permitted types and in amounts allowed have not been found effective or desirable.

SPICED HERRING

Spiced herring, as packed in the United States, is prepared entirely from fish cured during the fishing season, held in storage and manufactured into spiced herring products as the market requires. Herring may be specially cured for this product, or "Scotch cure" or "Labrador" salt herring may be substituted. Herring not specially cured for spicing is reported to have a shorter period of preservation, is darker in color, lacks flavor, and is tougher and more fibrous in texture. Such raw material is used when the stock of specially cured herring is exhausted, or in places where it cannot be secured.

Most of the specially cured herring is prepared from alewives or river herring (*Pomolobus pseudoharengus*) in the Chesapeake Bay area. A variety of curing methods is used of which the following is typical: The cut herring are cleaned thoroughly, with special attention to removal of the kidney, the dark streak along the backbone. The fish are rinsed in fresh water, and placed in a curing tank where they are covered with a brine testing 80 to 90° salinometer, which contains 120-grain distilled vinegar to an acidity of about 2½ percent. They are left in this brine until the salt has "struck through" the flesh, but they must be removed before the skin starts to wrinkle or lose color. The length of cure depends on the judgment of the curer and varies with the temperature conditions, freshness and size of the fish. The average length of cure is reported to be 5 days. Various sources of information give curing times running from 3 to 7 days.

As soon as the herring have absorbed sufficient salt, they are packed in barrels. These are often secondhand, previously used for soda fountain syrup. The barrels are headed up, filled with a salt-vinegar brine testing 70° salinometer and shipped to marketing centers such as Chicago or New York for final manufacture.

When the herring are received at the manufacturing center they are cut in cross sections if they are to be packed as "cut spiced" herring, sliced into fillets and boned if they are intended for "roll-mops," and the backbone is removed but the sides remain joined, if they are to be prepared as "Bismarck" herring. The herring are repacked in kegs which are filled with a solution of distilled vinegar diluted with water to 3 percent acidity, and containing sufficient salt to test 35° salinometer. The kegs are then put into cold storage at 34° F. to be held until required.

The final process of manufacture is begun by soaking the herring in a tank of cold water from 8 to 10 hours. They are then removed, drained and placed in a solution of vinegar, salt and water for 72 hours. This solution is made up in the proportion of 1

gallon of 6 percent white distilled vinegar to 1 gallon of water and 1 pound of salt.

CUT SPICED HERRING

Sliced herring are then packed in 8-ounce tumblers, or in 16- or 32-ounce jars, with whole mixed spices. The amount of spices added to each container is approximately 2 teaspoons to an 8-ounce tumbler, $\frac{3}{4}$ tablespoon to a 16-ounce jar, and $1\frac{1}{2}$ tablespoons to a 32-ounce jar. A slice or two of onion, a slice of lemon, or a strip of canned pimiento may be placed around the sides, depending on the preference of the individual packer. Each container is then filled with vinegar diluted to $2\frac{1}{2}$ percent acidity, containing 1 pound of sugar, $\frac{1}{4}$ pound of salt, 5 drops oil of cloves, 5 drops oil of allspice, and 5 drops oil of cardamon per gallon of solution. The spice oils are usually added to the sugar before dissolving it in solution, as the spice flavor is then more evenly distributed.

The amount of spice oils and variety of spice flavors used, may be altered to suit the taste of the packer or his market. This formula is typical rather than standard. The jars are then vacuum sealed, wiped clean, labelled, and packed 1 or 2 dozen jars to the fiberboard carton. Length of preservation depends on care in manufacture and storage. If held under refrigeration this product may remain in good condition for 12 months.

ROLLMOPS

The method of packing given previously is followed, the only difference being that fillets are rolled around a small piece of dill pickle or bit of onion, and fastened with wooden tooth picks.

BISMARCK HERRING

Boned and trimmed fish are packed vertically in glass containers of various sizes, such as 8-ounce tumblers, 16- or 32-ounce jars, and prepared as outlined for the final packing of cut spiced herring.

OYSTERS

The packaging and distribution of fresh shucked oysters in individual sealed containers has recently become an important factor in the oyster industry. Fresh shucked oysters are packaged in individual retail size containers on the Atlantic Coast to some extent, but this is primarily a development of the Pacific Coast oyster industry.

Four types of sealed containers are used: (1) Hermetically sealed tin cans, preferably in pint and half-pint sizes; (2) friction top cans in the same sizes; (3) glass bottles of the milk bottle type

in quart and pint sizes, with the regular milk bottle caps; and (4) waxed pasteboard cartons, in quart, pint, and half-pint sizes, either of the ice cream carton or cup type. Bottles and pasteboard containers are today practically limited to local distribution by problems of shipping and handling. At present the hermetically sealed container is the type recommended for use in the development of a larger retail market for fresh oysters.

Troubles such as swollen cans and deterioration are encountered at times in packaging and distribution of fresh oysters in hermetically sealed containers. This may be due to lack of knowledge of the limitations in keeping quantities of fresh shucked oysters. McConkie reports that "an incomplete knowledge of storage temperatures necessary to preserve a satisfactory quality for an adequate period of time to permit distribution and consumption. It is our opinion that producers, distributors, and consumers have all been guilty of mishandling in some instances. Probably there will always be an occasional consumer complaint resulting from carelessness on his own part, but the major improvements calculated to overcome the present difficulties must be made in the producing plants and their distributive agencies."²⁰

Discussion of the growing and harvesting of oysters would involve needless duplication as this information is available in other publications, to which the reader is referred; Tressler (1923) and Fiedler (1936). The packer must keep constantly in mind that the oysters must be in good marketable condition with firm, sound meats. On the Pacific Coast some oysters in certain beds have been found to be in spawning condition during the latter part of October. Oysters taken from various coastal areas of the Atlantic Coast may be still "thin" and "poor" during the early fall if growing conditions have been unfavorable.

The oysters should be unloaded immediately on arrival at the plant, and stored in a chill room at temperatures between 40 to 45° F. until they can be shucked. This is done in Pacific Coast shucking plants, but is not common practice on the Atlantic Coast. An alternative method, serving the same purpose is to hold oysters in sink floats near the opening house, shucking the mollusks immediately on removal from the float. Oysters in shells should not be allowed to stand in the direct rays of the sun, or be exposed to the open air.

In the more up-to-date plants packaging oysters in hermetically sealed containers, shell oysters are removed from chill storage to the shucking room only as required by the openers. As the product is not processed it is subject to contamination so that extreme

²⁰ McConkie, J. E. Handling, Packaging and Distribution of Fresh Oysters. 9 pp. Bull. Research Department, American Can Co., Inc., Portland, Oregon.

care in plant sanitation and the various production steps is necessary to reduce bacterial contamination to a minimum.

In a representative plant packing fresh oysters in hermetically sealed containers, the shucking room is built of concrete, with a continuous expanse of window on two sides, amounting to about one-third of the wall area. The floor is waterproofed concrete, with numerous drains. The benches, also waterproofed concrete, run along two outer walls just below the windows and are divided into individual working spaces, each large enough to hold a bushel of shell oysters. Each space is equipped with an electric light, shaded and hung so that the workers' eyes will be protected from glare, and throwing the maximum of light on the working space. All pans, shucking cups, buckets and similar utensils are made of non-corroding metal.

The oysters should be shucked into small containers preferably not larger than quart size cups so that the meats may be collected frequently. Puget Sound oyster men favor shallow pans holding about one pint. However, the Olympia oyster is smaller than either the eastern or "Pacific" varieties, so that a longer time is required to shuck a given quantity. The shucked meats are washed immediately, preferably in small batches, for more thorough washing, to reduce exposure to the air and possible contamination.

On the Pacific Coast the meats are usually washed by hand, stirring a quantity of meats in an equal amount of water and draining them in colanders. On the Atlantic Coast, the oysters are "blown" in shallow tanks, fitted with perforated false bottoms. The tank is provided with a water pipe and a compressed air line enters the bottom. Ice may be added, especially if the temperature of the water is higher than 45° F. Chilled oysters should not be washed in water at temperatures of 50 to 60° F., making it necessary to re chill the meats.

As the oyster meats are placed in the blower the compressed air is turned on, aerating the water and agitating the meats gently, until bits of shell, sand, dirt, or other waste are thoroughly removed. The use of a 3-percent brine for washing is required by law in some localities, to prevent "bloating" or swelling which occurs if the meats are left in fresh water over long periods of time.

After washing, the oyster meats are allowed to drain until all surplus moisture has been removed. In some plants they are then graded for size. The oysters should be inspected for quality before packaging, and any discolored or cut meats removed.

Filling must be carefully controlled. The meats are hand filled into "sanitary" type cans. The cans are not vacuum sealed and

the slightest overfilling causes the ends to spring out, giving the impression of spoilage, so a $\frac{1}{4}$ -inch headspace must be left in filling. Springers are most apt to occur in $\frac{1}{2}$ -pint cans. The can lids, which should be equipped with gaskets, are sealed on the cans by semi-automatic closing machines.

The packaged oysters are chilled immediately after sealing the cans. Air cooling in chill rooms at 32° F. is used by some packers, but it is regarded as a better practice to submerge the containers in tanks of ice water at 32° F., or to pack them in bins of finely crushed ice. Friction top cans cannot be placed in ice water, but should be packed in finely crushed ice. The rate of heat extraction is much slower if the pack is air cooled. After chilling, the sealed containers should be held at 32° F., either in chill rooms or in crushed ice until they are shipped.

Some packers do not ice the shipping containers for short distance shipments or for local distribution, but it is good practice to ice all shipping containers, using an amount of ice one-half the weight of the product. Long distance shipments may require a larger amount of ice, and should be re-iced in transit.

Producers of fresh canned oysters are finding it advisable to educate retailers, hotels, restaurants and individual consumers to the fact that the oysters must be kept at temperatures as near 32° F. as possible, keeping them in mechanical refrigerators or in crushed ice, until they are prepared for the table. The cans should never be displayed in show windows or elsewhere than in refrigerated show cases.

Fresh oysters packed in hermetically sealed containers have a period of marketability of about one week after packing. If packing conditions and storage temperatures approximate the ideal, they may be held as long as 10 days or 2 weeks and still show very little loss in quality (McConkie; N. D.)

CRAB MEAT (PACIFIC COAST AND ALASKA)

A considerable portion of the production of Pacific Coast "Dungeness" crab is marketed as fresh cooked meat, packed in hermetically sealed tins and shipped in ice. This is known as "cold-pack" crab meat. If the supply is larger than the market can absorb at the time it is frozen and held until needed.

The Dungeness crab-canning procedure is followed up to and including the brine dip. The drained meat is sent to the retort in open trays. Here it is steamed for about 20 minutes, gradually bringing up the temperature from 212 to 220° F. The trays of steamed meat are placed in racks and allowed to cool over night. In the morning the meat is packed in No. 10 cans lined with vegetable parchment paper, to a net weight of 5 pounds, or in 1- or 2-

ound lithographed cans. Body and leg meat is filled into the cans in equal proportions. The cans are sealed without vacuum, packed in finely crushed ice, then shipped and held under refrigeration. The market for Dungeness cold pack crab is largely in the Pacific Coast region, although some is shipped to the Middle Western and Rocky Mountain States.

SHRIMP MEAT (ALASKA)

The production of non-processed cooked shrimp, packed in hermetically sealed containers, is at present confined almost entirely to Alaska. The otter trawl and haul seine used in the shrimp fisheries of the Atlantic Coast have been found ineffective to date in Alaska, as the shrimp are taken at depths of 50 fathoms or more, and the bottom is very irregular. The beam trawl in sizes ranging from 16 to 60 feet in beam is the only type of fishing apparatus used in this industry.

The gear has been mechanized so that it can be handled by a crew of 2 men. The trawl is dragged over the bottom at the rate of from $\frac{1}{2}$ to $1\frac{1}{2}$ miles per hour, according to depth of water and type of bottom. The length of the haul depends on the extent of the fishing area and the amount of debris collected in the trawl. When it is thought the trawl should be lifted, the boat is stopped and the net is hoisted to the surface. If a soft or muddy bottom has been fished, the trawler gets under way again and tows the gear until the catch is well washed.

The slack is hauled in until the catch has been concentrated in a small portion of the bag, when the shrimp are removed by a large dip net and deposited on a cleaning table where they are separated from shells, seaweed, "scrap" fish and other debris, and packed into large-boxes with a capacity of approximately 200 lb. net. Ten boxes is stated to be a good day's catch.

As soon as the catch is unloaded, the whole shrimp are dropped into tanks of water held at temperatures of 210 to 212° F. by jets of live steam. The shrimp are boiled for about 5 minutes or until the meat has shrunk sufficiently so that air spaces appear between shell and meat. When sufficiently cooked, the shrimp are dipped from the tank onto shallow trays with wooden sides and wire mesh bottoms. These trays are set in racks until the shrimp are dry and cool. Shrimp are usually boiled late in the day and left in the racks overnight.

After picking, the meat is first washed in fresh cold water, then dropped in a saturated salt brine, where it is held for 3 minutes. The brined shrimp meats are again cooked in a retort for 3 minutes at 220° F. After cooking, the meat is again piled in trays and taken to the racks, where it is generally left until the next

day to dry and cool. The meat is then passed through a fanning machine, which blows out all bits of loose shell and antennae which have not been previously removed.

The meat is filled in No. 10 cans, lined with vegetable parchment paper, to a net weight of 5 pounds. The filled cans are hermetically sealed without vacuum. The cans are packed in finely crushed ice and shipped south by steamer.

This shrimp is known as "fresh shrimp meat" or sometimes as "cold-pack" shrimp. It is purchased by retail fish markets and by the hotel and restaurant trade. If demand is slow, surplus cans of shrimp meat may be frozen at approximately -5° F. and held in storage at about 5° F., until marketed. The shrimp remain in good condition and are apparently unaffected by freezing.

SEAFOOD COCKTAILS

Prepared seafood cocktails are packed in all important fisheries centers of the Pacific Coast and Rocky Mountain States. The varieties marketed are clam, Olympia oyster, crab and shrimp.

This product is manufactured on a home or kitchen scale and no two packers follow the same formula. Glass containers only are used, bottles with a net capacity of 4 and 6 ounces. The bottles are specially designed for the purpose with a wide mouth and short neck. Some cocktails are occasionally packed in one-sided 8-ounce preserve jars, but this is not regarded as a good practice. Such jars do not make as good an appearance, are harder to fill, seal and empty.

The principal factor in preparing seafood cocktails is the sauce. Each packer has developed his own formula. Numerous experiments are made until the desired flavor and maximum length of preservation are obtained. A bottled cocktail sauce requires a higher proportion of acid, spices and salt, and a lower moisture and sugar content than a sauce prepared for immediate use. The basis of a cocktail sauce is tomato ketchup. Specifications for a good quality sauce call for the highest grade of prepared ketchup obtainable, a strictly fancy grade, not sweet, which is usually purchased in No. 10 cans, 6 to the case.

Cocktails are packed in quantity during the winter and held for sale but at other times they are usually packed only on order. It is customary to allow a rebate for return of empty containers.

Only the freshest seafood should be used. Crabs and shrimp are cooked and the meat is made up into cocktails immediately, as use of meat cooked some time previously is believed to reduce length of preservation and to lower the quality of the product. Clams and oysters are shucked immediately before packing. Oysters going into cocktails should show absolutely no "bloat." "Little-

neck" or "cherrystone" clams give better results than the larger sizes, because of superior flavor and tenderness. The small size of Olympia oysters secures a more even blend of flavor with the sauce. Cocktail makers also claim the flavor of these oysters to be superior. Crab meat should be divided into small pieces so that it will mix well with the sauce, but should not be shredded finely or the crab flavor will be lost. Small shrimp are preferred for cocktails and if large shrimp are used they should be chopped into two or more pieces.

The seafood portion of the cocktails is filled into the bottles which are sterilized just before use. Containers should be dry when filled. The average amount of crab and shrimp meat placed in each 4-ounce container is $1\frac{1}{2}$ ounces, while the 6-ounce size receives $2\frac{1}{2}$ to 3 ounces. Some packers increase the amounts to $2\frac{1}{2}$ and $3\frac{1}{2}$ ounces respectively, but as the margin of profit is small and competition is keen, this is usually done only in markets catering to the higher priced trade. Clams and oysters are filled in by count. The number of Olympia oysters to a 4-ounce cocktail runs from 4 to 8. A good cocktail should contain at least 6 oysters.

The cocktail sauce is then added in amount sufficient to fill the containers. Bottles are hermetically sealed, in the majority of cases, with a crown type seal, though a screw top lid is occasionally used. Vacuum sealing has been tried, but is at present almost entirely abandoned. Small amounts of clam or oyster juice may be used to dilute the ketchup and replace part of the acid, in making up clam and oyster cocktails.

Fresh cocktails remain in good condition about 10 days under ordinary conditions of merchandising. This may be increased to about 30 days, if the cocktails are held at 34 to 36° F. If a maximum length of preservation is desired, cocktails should be retailed from refrigerators or refrigerated showcases. Retailers should be cautioned that exposure on shelves or on top of showcases, in brilliant sunshine, or placing the containers near artificial light, hastens spoilage.

Some cocktails are pasteurized for 1 hour at 170° F. While length of preservation is increased, the product is regarded as inferior to fresh cocktails. Attempts to obtain commercial sterility have not been successful to date. Processing at temperatures 212° F. or higher, caramelizes the sauce and makes the seafood portion of the cocktail hard and fibrous.

COCKTAIL SAUCES

A successful manufacturer must experiment to determine the type of cocktail sauce best suited to his local trade. One of the packers of cocktails also markets a prepared sauce for sale to

packers in other areas. The following sauce formulae are typical, but are presented only for guidance:

SAUCE NO. 1

6 cups tomato ketchup	4 cups lemon juice
2 cups horseradish	Salt, celery salt and tabasco sauce to taste

Beat the ingredients together in an electric mixer, until they are well blended. This applies to all sauces.

SAUCE NO. 2

3 cups tomato ketchup	1 cup lemon juice
1 cup Worcestershire sauce	$\frac{1}{2}$ cup red pepper sauce
2 cups horseradish	Salt to taste

This sauce is more pungent than No. 1 and may be too peppery for some people.

SAUCE NO. 3

2 cups tomato ketchup	1 cup vinegar
2 cups lemon juice	2 teaspoons salt
1 cup horseradish	2 teaspoons white pepper
1 cup Worcestershire sauce	1 teaspoon tabasco sauce

In using Sauce No. 3, the shrimp or other seafood is marinated for 2 hours before filling into the containers, in a solution consisting of the vinegar and one cup of the lemon juice listed in the ingredients, together with the pepper and salt. The other ingredients are mixed well, then poured over the seafood when it is filled in the container.