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## 1. Purpose

This document provides guidelines/ instructions/ policy for sensory analysis of seafood and requirements for sensory analysts.

## 2. Scope

Sensory analysis is a critical tool used by FDA to protect consumers from seafood that has become adulterated due to decomposition. To stand up in court, the integrity of the sensory program depends on the credibility of the sensory analysts and the manner in which the analyses are conducted, reported, and interpreted for regulatory purposes.

## 3. Responsibility

### 3.1. Basic Considerations for Selecting Objective Sensory Analysts

Personality Factors: Personnel who perform sensory tests should be motivated for the job, responsible, dependable, conscientious, and use tact, per ISO 13300-1 Sensory analysis — General guidance for the staff of a sensory evaluation laboratory. Staff Responsibilities: The following is from ISO 13300-2 Sensory analysis — General guidance for the staff of a sensory evaluation laboratory

#### A. Sensory Analysts

Sensory analysts should demonstrate that they have the ability to perceive basic odors and tastes and be able to describe their findings in a consistent manner. One area that is important in selection and training is the ability of the analyst to distinguish between the four basic tastes which are bitter, sour, salt, and sweet.

#### B. Panel Leaders and Trainers:

“A panel leader needs basic knowledge in sensory evaluation principles to facilitate his/her job as panel leader...They should be confident, friendly, capable of maintaining authority and control of the group, and command respect. ... The panel leader should be able to inspire the assessors, keep them motivated, and tactfully solve problems within the

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panel. For the panel to be effective, the panel leader needs to be patient, fair, honest, and non-judgmental.”

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#### 4. Background

It takes many years of experience, with daily involvement, to properly recognize spoilage odors and flavors in seafood products and, more importantly, to avoid rejecting products due to odors and flavors that may be present but are not caused by decomposition. Incorrect decisions by FDA can be extremely costly to the importer/owner of rejected product and failing to detect adulterated product is costly to consumers.

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#### 5. References

Section 402 (a)(3) of the Food, Drug, and Cosmetic Act states that a food is deemed to be adulterated if it consists in whole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food. It is this section of the Act that lends itself to the findings of the sensory analyst.

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#### 6. Procedure

##### 6.1. Taste Exercise

Purpose: To demonstrate basic taste sensations to candidates for later testing purposes.

##### 6.1.1. Equipment Needed

- One-gallon spring/filtered water.
  - Four 500 mL graduated glass or Nalgene flasks with covers.
  - Four 2-ounce plastic cups with lids for each participant.
  - Cups for rinsing and spitting.
  - Gram scale.
  - Compounds [sucrose (sugar), citric acid, NaCl (salt), and caffeine].
  - Ballots (see Attachment A: Sensory Scale).
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### 6.1.2. Exercise Set Up

- Prepare the four basic taste solutions one or two days prior to screening.
- Add compound to flask, then fill to 400 mL with filtered water.
  1. Sweet: 20.0 g sucrose.
  2. Sour: 0.2 g citric acid.
  3. Salty: 1.4 g NaCl.
  4. Bitter: 0.2 g caffeine.
- Store bulk solution in cooler/refrigerator.
- Label the side of the cups with the number associated with solution, 1 each per participant: 1= sucrose, 2 = citric acid, 3 = NaCl, and 4 = caffeine.
- Let compound sit overnight and shake to dissolve. Fill the 2 oz. cups half full and cover. The analyst should have enough solution to make up 15 to 20 cups.
- Make sure solutions are at room temperature when presented.

### 6.2. Screening Exercise

- Remove cups from cooler one to two hours prior to screening. It is important that the solutions be evaluated at room temperature.
- Present the four basic tastes.
- Pass out ballots and read instructions to participants.
- Have them go through the samples in order and ask them to pay attention to where they are sensing the solutions on their tongue and how long it takes to detect. Ask them to save some for re-tasting.

### 6.3. Analysis of Authentic Sample Packs

FDA seafood sensory analysts are evaluated for their ability to make correct regulatory decisions in the following six categories of seafood products:

- Category 1: Fresh/Frozen Raw Invertebrates
- Category 2: Fresh/Frozen Raw Finfish (other than scombrototoxin-forming fish species)
- Category 3: Fresh/Frozen Raw Scombrototoxin-Forming Fish Species

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- Category 4: Processed Scombrototoxin-Forming Seafood Products Other Than Canned/Pouched (Retort) Tuna
- Category 5: Processed Seafood Products (other than scombrototoxin-forming fish species)
- Category 6: Canned/Pouched (Retort) Tuna

If possible, examples of all six product categories should be used to provide the trainee with a wide range of products to be able to assess their quality using the sessions provided below. The instructor should have significant experience in all six categories as a journeyman sensory analyst. Authentic sample packs should be prepared by the National Expert(s) and sent out to provide consistency in the standard to be applied within the product examples to be covered during the training sessions. This will allow for minimum variability within the sample packs.

### **6.3.1 Demonstration Session**

#### **6.3.1.1. Purpose**

This exercise is designed to provide a complete range of product samples from each of the categories listed above from very fresh to very decomposed and to show the cut-off point between acceptable and unacceptable product.

#### **6.3.1.2. Procedure**

The analyst will examine a set of samples arranged in order from highest quality to lowest quality. Sample quality will be rated on a 10-centimeter unstructured line scale (see Attachment A: Sensory Scale). For all samples examined, the trainee will indicate his/her rating by placing a vertical mark on the 10-centimeter line. If the sample is the very highest quality possible (extremely fresh), the vertical line is placed at the very left end of the 10-centimeter line. If the quality is the lowest possible (extremely decomposed), the vertical line is placed at the very right end of the line. Positions from the extreme left end of the line to the mid-point indicate the sample passes for decomposition whereas those to the right of the mid-point indicate the sample fails for decomposition. As the position of the mark moves from the left to the right of the line, the quality of the sample declines. The vertical line dividing the line scale in half demarcates pass from fail and is not used.

#### **6.3.1.3. Discussion**

The discussion of each set of samples with the instructor will take place immediately upon rating of the last sample to examine the analyst's results and establish which degree of spoilage defined the accept/reject level for each type of product examined. The analyst also is to be familiar with the sensory terms

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listed above to be able to describe their findings and the reason for their decisions.

#### **6.4. Blind Discussion Session**

This session consists of having the analyst, along with the instructor, examine a random set of samples that represent the same product examined during the demonstration session. The purpose of this exercise is to determine if the analyst can apply the criteria that was used to determine accept/reject levels and to reinforce the decisions made on the demonstration samples.

#### **6.5. Practice Test**

The purpose of this session is to collect data on the assessments made by the analyst using blind coded samples and to allow the trainee to practice what they have learned during the demonstration and blind discussion sessions. Results are discussed and the analyst will be allowed to go back and look at the samples.

#### **6.6. Final Test Session**

The purpose of this session is to assess the analyst's retention of the sensory training for each product type examined. The analyst is to assess the blind coded samples without the presentation of the standard reference samples beforehand.

### **7. Glossary/Definitions**

Sensory analysts should be familiar with definitions of some of the terms used in the sensory analysis of seafood, including the following:

#### **7.1. Sensory Categories**

*NOTE: Examples listed in these categories are not exhaustive.*

##### **7.1.1. Category 1: Fresh /Frozen Raw Invertebrates.**

Examples: Clam, conch, copepod, crab, crayfish, cuttlefish, jellyfish, krill, langostino, limpet, lobster, mussel, octopus, oyster, scallop, sea cucumber, sea squirt, sea urchin, shrimp, snail, squid, etc.

##### **7.1.2. Category 2: Fresh/Frozen Raw Finfish (other than scombrototoxin-forming fish species).**

All non-processed fish species not listed as possessing histamine as a potential hazard in the current edition of the "Fish and Fishery Products Hazards and Controls Guidance."

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Examples: bass, butterfish, cod, croaker, cusk, eel, flounder, grouper, haddock, monkfish, mullet, perch, pollock, porgy or scup, salmon, shark, sole, spot, tautog, tilefish, trout, whiting, wolfish, etc.

### **7.1.3. Category 3: Fresh/Frozen Raw Scombrototoxin-Forming Fish Species.**

All non-processed fish species listed as possessing histamine as a potential hazard in the current edition of the “Fish and Fishery Products Hazards and Controls Guidance.”

Examples: Amberjack or yellowtail, anchovy, bluefish, bonito, escolar or oilfish, gemfish, herring, jack (e.g., bluerunner, crevalle, rainbow runner, rooster fish), kahawai, mackerel (not Atka), mahi-mahi, marlin, pilchard or sardine, sailfish, sardine, saury, shad, spearfish, sprat or bristling, trevally, tuna, wahoo, etc.

### **7.1.4. Category 4: Processed Scombrototoxin-Forming Seafood Products Other Than Canned/Pouched (Retort) Tuna.**

This category contains processed seafood products made from fish species found under ‘Category 3’. For the purpose of this document, processed products include those products (other than canned/pouched tuna) that have been canned, cooked, and/or treated with additives including carbon monoxide, breeding, sauces, marinade, salt, and smoke.

### **7.1.5. Category 5: Processed Seafood Products (other than scombrototoxin-forming fish species).**

This category contains processed seafood products made from fish species found under either ‘Category 1’ or ‘Category 2’. For the purpose of this document, processed products include those products that have been canned, cooked, and/or treated with additives including carbon monoxide, breeding, sauces, marinades, salt, and smoke.

### **7.1.6. Category 6: Canned/Pouched (Retort) Tuna.**

This category contains tuna in cans, pouches, and retorted plastic containers (such as cups)

## **7.2. Sensory Odor Definitions**

*Note – the terms odor and aroma are used interchangeably. This list was originally compiled by NMFS National Sensory Branch, and it has been amended.*

**Appearance** All the visible characteristics of a substance/sample.

**Analyst/Assessor** Any person taking part in a sensory test.

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<b>Bilgy</b>	The aromatic associated with anaerobic bacterial growth, which is illustrated by the rank odor of bilge water. The term “bilgy” can be used to describe fish of any quality which has been contaminated by bilge water on board a vessel. Bilge water is usually a combination of salt water, fuel, and waste water.
<b>Bitter</b>	One of the four basic tastes; primarily perceived at the back of the tongue; common to caffeine and quinine. There is generally a delay in perception (two-four seconds) and a lingering sensation in the mouth.
<b>Briny</b>	The aroma associated with the smell of clean seaweed, a beach and/or ocean air.
<b>Brothy</b>	Aromatic associated with boiled meat, usually accompanied by a umami sensation in the mouth.
<b>Burnt</b>	Aromatic associated with heated, scorched, or blackened substances.
<b>Cardboardy</b>	Aromatic associated with slightly oxidized fats or frozen fish that has taken on a “cold storage” off flavor; reminiscent of wet cardboard.
<b>Carry-over</b>	A decrease in sensitivity to a given stimulus resulting from exposure to previous samples containing the same stimulus.
<b>Chalky</b>	In reference to texture, a product which is composed of small particles which imparts a drying sensation in the mouth. In reference to appearance, a product which has a dry, opaque, chalk-like appearance.
<b>Cheesy</b>	Sour aromatic associated with aged cheese and butyric acid. Sometimes found in advanced decomposition of fish.
<b>Chemical</b>	A general term associated with many types of aromatic compounds such as solvents, cleaning compounds, and hydrocarbons.
<b>Chickeny</b>	Aromatic associated with cooked chicken white meat and breast.
<b>Cucumber</b>	The aroma associated with fresh cucumber; similar aromas can be associated with certain species of very fresh raw fish.
<b>Decompose</b>	To break down into component parts.
<b>Decomposed</b>	Fish that has an offensive or objectionable odor, flavor, color, texture, or substance associated with spoilage.
<b>Distinct</b>	Capable of being readily perceived.



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<b>Feedy</b>	<p>“Feedy” is used to describe the condition of fish that have been feeding heavily. After death, the gastric enzymes first attack the internal organs, then the belly wall, then the muscle tissue. If the enzymes have penetrated into the flesh, they are capable of causing sensory changes characterized by soft, foul smelling, discolored muscle tissue. This odor may be associated with dimethyl sulfoxide (DMS) and may be attributed to certain zooplankton as it passes through the food chain. The odor of “feedy” fish has been described as similar to certain sulfur-containing cooked vegetables, such as broccoli, cauliflower, turnip, or cabbage.</p>
<b>Fecal</b>	<p>Aroma associated with feces. Sometimes found in very advanced decomposition of seafood.</p>
<b>Fermented</b>	<p>Sour, fruity aromatic associated with rotting fruit, vegetables, meat or seafood.</p>
<b>Firm</b>	<p>A substance that exhibits moderate resistance when force is applied in the mouth or by touch.</p>
<b>Fish</b>	<p>Any of the cold-blooded aquatic vertebrate animals commonly known as such. This includes Pisces, Elasmobranchs and Cyclostomes. Aquatic mammals, invertebrate animals, and amphibians are not included.</p>
<b>Fishy</b>	<p>Aroma associated with aged fish, as demonstrated by trimethylamine (TMA) or cod liver oil. Seafood exhibiting this characteristic is of poor quality but may or may not indicate decomposition, depending on other aromatics present.</p>
<b>Flavor</b>	<p>Sensory perceptions when food is placed in the mouth resulting from the stimulation of basic tastes, aromatics, and feeling factors.</p>
<b>Freshness</b>	<p>Concept relating to time, process, or characteristics of seafood as defined by a buyer, processor, user, or regulatory agency.</p>
<b>Fruity</b>	<p>Aroma associated with slightly fermented fruit. Term is used to describe odors resulting from high temperature decomposition in certain species of fish and is often described as cloying and sickly sweet/sour. Most times there will also be an underlying sour odor. One reference is propyl butyrate.</p>
<b>Gamey</b>	<p>The aroma and/or flavor associated with the heavy, gamey characteristics of some species such as mackerel. Similar to the relationship of fresh duck meat as compared to fresh chicken meat.</p>
<b>Glossy</b>	<p>A shiny appearance resulting from the tendency of a surface to reflect light.</p>

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<b>Grainy</b>	A product in which the assessor is able to perceive moderately hard, distinct particles. Sometimes found in canned seafood or products that have been in frozen storage.
<b>Grassy</b>	Green, slightly sweet aromatic associated with freshly cut grass or very fresh, high-quality finfish. This aromatic is most prevalent in fresh water fish.
<b>Intensity</b>	The perceived magnitude of a sensation.
<b>Iridescent</b>	An array of rainbow-like colors, similar to an opal or an oil sheen on water.
<b>Masking</b>	The phenomenon where one sensation obscures one or several other sensations.
<b>Mealy</b>	Describes a product that imparts a starch-like sensation in the mouth.
<b>Mercaptan</b>	Aromatic associated with sulfur compounds, reminiscent of skunk, brewing coffee, and rubber.
<b>Metallic</b>	Aroma and/or taste associated with ferrous (iron) sulfate, rust, or tin cans.
<b>Moist</b>	The perception of moisture being released from a product. The perception can be from water or oil.
<b>Moldy</b>	Aroma associated with moldy cheese or bread, or a wet moldy basement.
<b>Motor oil</b>	A heavy greasy aroma, often oxidized and turpeny.
<b>Mouth coating</b>	The perception of a film in the mouth.
<b>Mouth filling</b>	The sensation of a fullness dispersing throughout the mouth. An umami sensation, as stimulated by mono sodium glutamate (MSG).
<b>Mushy</b>	Soft, thick, pulpy consistency. In seafood, little or no muscle structure discernible when force is applied by touch or by mouth.
<b>Musty</b>	The aromatic associated with a moldy, dank cellar or attic.
<b>Nose feel/ burn</b>	Chemical “feeling” factor described as a warmth or burning or irritating sensation in the nasal passages when a product is sniffed.

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<b>Odor</b>	Sensation due to stimulation of the olfactory receptors in the nasal cavity by volatile material. Same meaning as aroma.
<b>Off odor</b>	Atypical (usually unpleasant) characteristics often associated with deterioration or transformation of a flavor product. Off odors and flavors most often linger in the nose and/or mouth.
<b>Opaque</b>	Describes product which does not allow the passage of light. In raw muscle tissue of fishery products, this is usually due to the proteins losing their light-reflecting properties due to falling pH. Fish flesh becomes more opaque as it deteriorates.
<b>Oxidized</b>	Aromatic associated with old oil that is stale or cardboardy. Leaves a lingering off flavor in the mouth or nasal cavity that is moderately lingering and coating.
<b>Pasty</b>	A product which sticks together like paste in the mouth when mixed with saliva. Forms a cohesive mass which may adhere to the soft tissue surfaces of the mouth or fingers.
<b>Persistent</b>	Existing without significant change; not fleeting.
<b>Pungent</b>	An irritating, sharp, or piercing sensation felt in the nose, mouth or throat.
<b>Putrid</b>	Aroma associated with decayed, rotting meat, especially beef and red-fleshed fish such as tuna. Aroma is lingering and often gives a heavy, cloying nose and throat feel.
<b>Quality</b>	A degree of excellence. A collection of characteristics of a product that confers its ability to satisfy stated or implied needs.
<b>Rancid</b>	Odor or flavor associated with rancid oil. Gives a mouth-coating sensation and/or a tingling perceived on the back of the tongue. Sometimes described as "sharp" or "painty".
<b>Reference</b>	Either a sample designated as the one to which others are compared, or another type of material used to illustrate a characteristic or attribute.
<b>Resinous</b>	Medicinal, woody aromatic, usually with a nose-feel. Pine is an example.

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<b>Rotting</b>	Aroma associated with decayed vegetables, in particular the sulfur containing vegetables, such as cooked broccoli, cabbage, or cauliflower.
<b>Rubbery</b>	A resilient material which may be deformed under pressure but returns to its original form once the pressure is released.
<b>Salty</b>	The taste on the tongue associated with salt or sodium.
<b>Sensory</b>	Relating to the use of the sense organs.
<b>Sickly-sweet</b>	Aroma associated with decayed, rotting meat, especially pork and fish with more light-colored flesh such as mahi-mahi. Aroma is lingering and often gives a heavy, cloying nose and throat feel.
<b>Slimy</b>	A fluid substance which is viscous, slick, elastic, gummy, or jelly-like, or the feeling of such a substance.
<b>Solvent</b>	A general term, used to describe many classes of solvents, such as acetone, isopropyl alcohol, turpentine, etc.. May be reminiscent of chemical solvents, plasticizers, and lighter fluid or paint aromas.
<b>Solventy</b>	Odor and/or nose “feel” or flavor associated with solvents such as acetone.
<b>Sour</b>	An odor and/or taste sensation, generally due to the presence of organic acids. Depending on the method of spoilage, fish may take on dairy or acetic sour as decomposition begins.
<b>Stale</b>	Odor associated with wet cardboard or frozen storage.
<b>STP</b>	Sodium tripolyphosphate. Can produce a soapy, alkaline feel and taste in the mouth.
<b>Sulfury</b>	Odor or flavor associated with sulfur-based materials such as matches, old garlic, onions, rotten eggs, broccoli, cabbage, mercaptans, or rubber.
<b>Sweet</b>	The taste on the tongue associated with sugar or sucrose.
<b>Taste</b>	One of the senses, the receptors for which are located in the mouth and activated by compounds in solution. Taste is limited to sweet, salty, sour, bitter and sometimes umami.
<b>Terminology</b>	Terms used to describe the sensory attributes of a product.
<b>Throat burn /feel</b>	Degree to which an irritating and/or burning sensation is felt in the throat.

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<b>Translucent</b>	Describes an object which allows some light to pass, but through which clear images cannot be distinguished (i.e. milk glass). Very fresh, raw fish flesh is very translucent.
<b>Transparent</b>	Describes a clear object, which allows light to pass and through which distinct images appear (i.e. clear glass).
<b>Turpenes</b>	Oily compounds found in citrus peel and resinous plants (pine). Imparts a sharp, lingering, chemical type sensation.
<b>Umami</b>	Taste produced by substances such as monosodium glutamate (MSG) in solution. A meaty, savory, or mouth filling sensation.
<b>Vegetable</b>	(old, fermented, or rotten) Odor associated with cooked or slightly spoiled sulfur-containing vegetables such as cooked broccoli, cabbage, or cauliflower.
<b>Vegetable</b>	(fresh) Green and/or planty odor or flavor associated with fresh cut non-sulfur containing vegetables.
<b>Watermelon</b>	Aroma characteristic of fresh cut watermelon rind. Similar odors are sometimes found in certain species of very fresh raw fish.
<b>Yeasty</b>	Also called "Fermented." Aroma associated with yeast and fermented products such as rising bread or beer.

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## 8. Records

- A. See Attachment A: Sensory Scale
- 

## 9. Supporting Documents

- A. Department of Fisheries and Oceans, Canada, Inspection Branch. (1986 to 1995). Sensory methods in fish inspections (Notes from Sensory Training course given by the National Centre for Sensory Science, Inspection Branch, Department of Fisheries and Oceans, Canada).
- B. Reilly, T. I. and York, R. K. (1993). Sensory analysis application to harmonize expert assessors of fish products. In: Sylvia, G., Shriver, A.
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L., and Morrissey, M. T. (Eds.), Proceedings of Quality Control and Quality Assurance of Seafoods, May 16-18, 1993, Newport, Oregon.

- C. Compliance Program Guidance Manual 7303.842, Domestic Fish and Fishery Products Inspection Program and Compliance Program Guidance Manual 7303.844, Import Seafood Products. Retrieved from FDA's [Compliance Programs](#) website.
- D. Compliance Program Guide Sec. 540.370 Fish and Fishery Products – Decomposition and Sec. 540.525, Decomposition and Histamine Raw, Frozen Tuna and Mahi-Mahi; Canned Tuna; and Related Species. Retrieved from FDA's [Compliance Policy Guides](#) website.
- E. ISO 13300-1:2006(E) Sensory analysis — General guidance for the staff of a sensory evaluation laboratory — Part 1: Staff responsibilities
- F. ISO 13300-2:2006(E) Sensory analysis — General guidance for the staff of a sensory evaluation laboratory — Part 2: Recruitment and training of panel leaders.

## 10. Document History

Revision #	Status* (D, I, R)	Date	Author Name and Title	Approving Official Name and Title
1.2	R	02/02/2010	LMEB	LMEB
1.3	R	02/06/2012	LMEB	LMEB
1.4	R	02/14/2013	LMEB	LMEB
02	R	05/27/2020	LMEB	LMEB

\* - D: Draft, I: Initial, R: Revision

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## 11. Change History

Revision #	Change
1.2	8.4 3. - "canned" changed to "processed" 8.6 – Reference 4. and 5. Added 8.8 – section added <b>Footer – web link updated</b>
1.3	Appendix 8.6 – form header removed
1.4	Header – Division of Field Science changed to Office of Regulatory Science
02	Added information related to "otherwise unfit for food", updated information related to personality factors and associated references, updated the sensory product categories, and updated references section.

## 12. Attachments

### List of Attachments

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Attachment C - Answer Key .....	18

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### Attachment A - Sensory Scale

Sample	Sensory Scale	Descriptors	Score
<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
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<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
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<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>
<div style="border: 1px solid black; width: 40px; height: 20px;"></div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">0</div> <div style="flex-grow: 1; border-bottom: 2px solid black; position: relative;"> <div style="position: absolute; left: 50%; transform: translateX(-50%);">50</div> </div> <div style="margin-left: 10px;">100</div> </div>	-----	<div style="border: 1px solid black; width: 40px; height: 20px;"></div>



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### **Attachment B - Sensory Analysis Questions**

1. What section of the FD&C Act talks about adulteration of seafood products by decomposition?
2. What are the four basic tastes?
3. What are the six seafood product categories?
4. Explain how the 10-centimeter unstructured line scale is used.

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### Attachment C - Answer Key

1. What section of the FD&C Act talks about adulteration of seafood products by decomposition?

Answer: Section 402 (a)(3).

2. What are the four basic tastes?

Answer: Sweet, Salty, Sour, and Bitter.

3. What are the six seafood product categories that the sensory analyst is provided training to make classifications on the quality in seafood products?

Answer:

- (1) Fresh/Frozen Raw Invertebrates
- (2) Fresh/Frozen Finfish other than Scombrotoxic Species
- (3) Fresh/Frozen Raw Scombrotoxic Species
- (4) Processed Scombrotoxic-forming Species other than canned/pouch tuna
- (5) Processed Seafood Products (other than scombrotoxin-forming species)
- (6) Canned/Pouched Tuna.

4. Explain how the 10-centimeter unstructured line scale is used.

Answer: The line scale is used to give a rating as to the quality of the sample being examined. If the quality of the sample is the highest possible, the analyst is to place a vertical line to the very left end of the 10-centimeter line scale. If the quality of the product is the very lowest possible, the vertical line is to be placed to the extreme right of the 10-centimeter line scale. Positions from the extreme left to the mid- point indicate the sample is passable for decomposition and whereas those to the right of the mid- point indicate the sample fails for decomposition. As the position moves from the left to the right of the line, the quality of the sample declines. The vertical line dividing the line scale in half demarcates pass from fail and is not used.