APPENDIX 12.1 SPECTRUM TERMINOLOGY FOR DESCRIPTIVE ANALYSIS

The following lists of terms for appearance, flavor, and texture can be used by panels suitably trained to define the qualitative aspects of a sample.

When required, each of the terms can be quantified using a scale chosen from Chapter 5. Each scale must have at least two, and preferably three to five, chosen reference points, for example, from Appendix 12.2.

A simple scale can have general anchors:

None ---------- Strong

or a scale can be anchored using bipolar words (opposite):

Smooth ----------Lumpy
Soft ----------Hard

Attributes perceived via the chemical senses in general use a unipolar intensity scale (None–Strong), while for appearance and texture attributes, a bipolar scale is best, as shown below.

A. Terms Used to Describe Appearance

1. Color

a. Color hue	The actual color name or hue, such as red, blue, and so on. The description can be expressed in the form of a scale range if the product covers more than one hue: [Red ---------- Orange]
b. Intensity	The intensity or strength of the color from light to dark: [Light ---------- Dark]
c. Chroma	The chroma (or purity) of the color, ranging from dull, muddied to pure, bright color. Fire-engine red is a brighter color than burgundy red: [Dull----------Bright]
d. Evenness	The evenness of distribution of the color, not blotchy: [Uneven/blotchy----------Even]

2. Consistency/Texture

a. Visual viscosity	The visual thickness of the liquid: [Thin ---------- Thick]
b. Roughness	The amount of irregularity, protrusions, grains, or bumps that can be seen on the surface of the product. Smoothness is the absence of surface particles:

APPENDIX 12.6 SPECTRUM DESCRIPTIVE ANALYSIS TRAINING EXERCISES

A. Basic Taste Combinations Exercise

1. Scope

This exercise serves as a basic panel calibration tool. A product's flavor often includes a combination of two or three taste modalities, and the blends of salt, sweet, and sour provide the panel with an opportunity to develop the skill of rating taste intensities without the distraction of aromatics.

2. Test Design

Trainees begin by familiarizing themselves with the reference set, consisting of six cups with single component solutions. The cups carry labels such as Sweet 5, Salt 10, and so on, where 5 = weak, 10 = medium, and 15 = very strong. The reference set remains available for the duration of the exercise.

The evaluation set consists of equal proportion blends of two or three of the reference solutions. The panel leader can prepare some or all of the blends in the evaluation set. The panel leader hands out one blend at a time, and the trainees record their impressions using the score sheet below.

At the end of the exercise, the sheet marked "average results" is made available. The panel leader should expect the panel means to fall within one point of these averages.

3. Materials

Assume 15 participants and 10 mL serving size: Prepare 1 L of each reference solution, which requires 150 g white sugar, 8.5 g salt, and 3 g citric acid. Serving items needed are

300 plain plastic serving cups, 2 oz size
15 individual serving trays
15 large opaque cups with lid (spit cups), for example, 16 oz size
15 water rinse cups, 6 oz size
6 water serving pitchers
1 packet napkins
60 tasting spoons (white plastic) if anyone requires those

4. Reference Set

Label	Content
Salt—5	0.35% NaCl
Salt—10	0.55% NaCl
Sweet—5	5% Sucrose
Sweet—10	10% Sucrose
Sour—5	0.1% Citric acid
Sour—15	0.2% Citric acid

Prepare solutions using water free of off flavors. Solutions may be prepared 24–36 h prior to use. Refrigerate prepared samples. On day of evaluation, allow to warm to 70 °F and serve 10 mL per participant.

5. Evaluation Set

Contents	Code
5% Sucrose/0.1% Citric acid	232
5% Sucrose/0.2% Citric acid	715
10% Sucrose/0.1% Citric acid	115
5% Sucrose/0.35% NaCl	874
5% Sucrose/0.55% NaCl	903
10% Sucrose/0.35% NaCl	266
0.1% Citric acid/0.35% NaCl	379
0.2% Citric acid/0.35% NaCl	438
0.1% Citric acid/0.55% NaCl	541
5% Sucrose/0.1% Citric acid/0.35% NaCl	627
10% Sucrose/0.2% Citric acid/0.55% NaCl	043
10% Sucrose/0.1% Citric acid/0.35% NaCl	210
5% Sucrose/0.2% Citric acid/0.35% NaCl	614
5% Sucrose/0.1% Citric acid/0.55% NaCl	337

Basic Taste Combinations Exercise: Composition of Evaluation Set

Code	% Sucrose	% Citric Acid	% NaCl
232	5	0.10	
715	5	0.20	
115	10	0.10	
874	5		0.35
903	5		0.55
266	10		0.35
379		0.10	0.35
438		0.20	0.35
541		0.10	0.55
627	5	0.10	0.35
043	10	0.20	0.55
210	10	0.10	0.35
614	5	0.20	0.35
337	5	0.10	0.55

Basic Taste Combinations Exercise: Average Results

Sample	Sweet	Sour	Salty
232	6	7	
715	4	8.5	
115	9.5	4	
874	6		6
903	7		9
266	11		7
379		9	9
438		10	6.5
541		6	11
627	5	3.5	5
043	8	8	9
210	9	4	6
614	3	9	8
337	4	6	11

B. Cookie Variation Exercise

1. Scope

This exercise teaches the Spectrum lexicon (list of terms) for baked cookies by exposing the trainees to a set of samples of increasing complexity, adding one ingredient at a time. Many products that are combinations of ingredients can be handled in this manner, by constructing the flavor complex one or two terms at a time.

2. Test Design

Trainees begin by evaluating cookie 1, baked from flour and water. They are asked to suggest terms to describe this sample. Together, the panel leader and the trainees discuss the terms, for example, cooked wheat/pasta-like/cream of wheat/breadcrumb, and doughy/raw/raw wheat/raw flour. Then, they select a single descriptor to represent each set of linked terms, for example, cooked wheat and raw wheat. Trainees record the results on the score sheet marked "vocabulary construction."

The panel leader hands out cookie 2, baked from flour, water, and butter, and trainees suggest terms for the added aromatics. Again, the group selects a single descriptor to cover each sequence of linked (overlapping) terms.

Once the lexicon is developed, it can be validated by comparing any two of the reference samples and determining whether the lexicon works to discriminate and describe the samples appropriately.

The score sheet marked "possible full vocabulary" can then be used to describe any pair of the samples, using a scale of 0 = absent, 5 = weak, 10 = medium, and 15 = very strong for the intensity of each attribute.

3. Reference Set

1. Flour, water
2. Flour, water, butter
3. Flour, water, margarine
4. Flour, water, shortening
5. Flour, water, shortening, salt
6. Flour, water, shortening, baking soda
7. Flour, water, sugar
8. Flour, water, brown sugar
9. Flour, water, butter, sugar
10. Flour, water, margarine, sugar
11. Flour, water, shortening, sugar
12. Flour, water, sugar, egg, margarine
13. Flour, water, sugar, egg, margarine, vanilla extract
14. Flour, water, sugar, egg, margarine, almond extract

4. Cookie Recipes

Prepare each recipe as shown in the table using the following information:

1. All recipes will serve up to 20–25 participants. Please see shopping list for proper ingredients to purchase. Prepare each recipe as you would any standard cookie dough (i.e., cream fat (if any) first; add sugar, flavorings, and egg (if any) and then add dry ingredients and liquid alternately. Mix just until all ingredients are combined. Use a standard mixer or food processor for mixing dough.
2. Spread evenly into a 9 × 13 in. rectangular baking pan that has been lined with coded parchment paper. Be sure to mark the appropriate cookie number on the parchment paper.
3. Note that some dough will be very thick. Use a roller to spread dough evenly in pan. Rollers can be wallpaper rollers from the hardware store or small pastry rollers from a cooking specialty shop or catalogue. Plastic wrap may be placed on top of the cookie dough while rolling to prevent sticking. Remove plastic before cutting and baking.
4. Precut cookies into 32 squares before baking (8 pieces × 4 pieces).
5. Bake in a preheated oven at 350°F for 35–40 min until slightly browned. Oven temperatures and time may vary for your oven.
6. All cookies should be very similar in color when baked—except for #8 (darker).
7. Cut cooled baked cookies on a cutting board. Remove dried edges and cut each batch into approximately 20–32 usable cookies. Use the best samples.
8. Cookies may be prepared up to 36 h in advance, wrapped in waxed paper or parchment paper (completely) and then wrapped in aluminum foil and stored at room temperature. Do not allow plastic wrap or foil to contact cookies as flavor transfer may occur. Label the foil.
9. Cookies may also be frozen for up to 4 weeks prior to the exercise, wrapped as indicated above. Bring cookies out of freezer to thaw 12–24 h before the exercise.
10. Serve one cookie per participant.

Serving suggestions:

Obtain one 9 × 11 inch Styrofoam tray (Standard size 12S) for each participant. Mark the tray into 15 sections (3 × 5) with a wax or grease pencil. Mark sections 1 thru 14. Place corresponding cookie in numbered section.
Alternately, you may label cupcake liners and place cookies into the liners. Serve liners on a tray.

1 2 1/2 cups flour 1 cup water	**2** 2 1/2 cups flour 1/4 cup water 1/2 cup +2 tablespoons butter	**3** 2 1/2 cups flour 1/4 cup water 1/2 cup +2 tablespoons margarine	**4** 2 1/2 cups flour 1/4 cup water 1/2 cup +2 tablespoons shortening
5 2 1/2 cups flour 1/4 cup water 1/2 cup + 2 tablespoons shortening 1 teaspoon salt	**6** 2 1/2 cups flour 1/4 cup water 1/2 cup + 2 tablespoons shortening 1/3 teaspoon baking soda	**7** 2 1/2 cups flour 3/4 cup water 1 cup white granulated sugar	**8** 2 1/2 cups flour 3/4 cup water 1 cup brown sugar
9 2 1/2 cups flour 1/4 cup water 1/2 cup + 2 tablespoons butter 1 cup white granulated sugar	**10** 2 1/2 cups flour 1/4 cup water 1/2 cup + 2 tablespoons margarine 1 cup white granulated sugar	**11** 2 1/2 cups flour 1/4 cup water 1/2 cup + 2 tablespoons shortening 1 cup white granulated sugar	**12** 2 1/2 cups flour 1/4 cup water 1 cup white granulated sugar 1/2 cup +2 tablespoons margarine
13 2 1/2 cups flour 1/4 cup water 1 cup white granulated sugar 1 egg 1/2 cup +2 tablespoons margarine 1 teaspoon pure vanilla extract	**14** 2 1/2 cups flour 1/4 cup water 1 cup granulated white sugar 1 egg 1/2 cup +2 tablespoons margarine 1 teaspoon almond extract		

5. Materials at Each Participant's Station

Opaque cup with lid (spit cup)
Translucent water rinse cup

Rinse water
Napkin
Cupcake paper liners coded: 1–14
or marked Styrofoam tray
Rinse water serving pitchers

6. Groceries and Paper Products
Purchase the total amount to serve the appropriate amount of each sample to each participant.

All-purpose flour
Butter, unsalted
Margarine, store brand
Shortening
White granulated sugar
Dark brown sugar
Eggs
Baking soda
Salt
Pure vanilla extract
Pure almond extract

Styrofoam trays (12S) and wax pencil or cupcake paper cups (14 per participant)
Individual serving trays (1 per participant)
Styrofoam (opaque) cups with lids (spit cups)
Water rinse cups
Napkins
Water serving pitchers

COOKIE VARIATION EXERCISE—VOCABULARY CONSTRUCTION

1. Flour, water	_____
2. Flour, water, butter	_____
3. Flour, water, margarine	_____
4. Flour, water, shortening	_____
5. Flour, water, shortening, salt	_____
6. Flour, water, shortening, baking soda	_____
7. Flour, water, sugar	_____
8. Flour, water, brown sugar	_____
9. Flour, water, butter, sugar	_____
10. Flour, water, margarine, sugar	_____

11. Flour, water, shortening, sugar	
12. Flour, water, sugar, egg, margarine	
13. Flour, water, sugar, egg, margarine, vanilla extract	
14. Flour, water, sugar, egg, margarine, almond extract	

COOKIE VARIATION EXERCISE—EXAMPLE OF RESULTS

1. Flour, water	raw wheat/dough/raw flour
	cooked wheat/paste/cream of wheat/ breadcrumb
2. Flour, water, butter	as #1 plus: butter/baked butter/ browned/butter
	toasted wheat
3. Flour, water, margarine	as #1 plus: heated vegetable oil; toasted wheat
4. Flour, water, shortening	as #1 plus: heated vegetable fat/Crisco
	toasted wheat/pie crust
5. Flour, water, shortening, salt	as #4 plus: salty
6. Flour, water, shortening, baking soda	as #5 plus: baked soda aromatic, salty
	baking soda feeling factor
7. Flour, water, sugar	as #1 plus caramelized, sweet
	toasted wheat
8. Flour, water, brown sugar	as #7 plus molasses
9. Flour, water, butter, sugar	as #2 plus sweet, caramelized
10. Flour, water, margarine, sugar	as #3 plus sweet, caramelized
11. Flour, water, shortening, sugar	as #4 plus sweet, caramelized
12. Flour, water, sugar, egg, margarine	as #11 plus baked eggy
13. Flour, water, sugar, egg, margarine, vanilla	as #12 plus: vanilla/vanillin/cake
14. Flour, water, sugar, egg, margarine, almond extract	as #12 plus cherry/almond

COOKIE VARIATION EXERCISE—POSSIBLE FULL VOCABULARY

CHARACTERISTICS	#379	#811
White wheat complex		
Raw		
Cooked		
Toasted		
Eggy		
Shortening complex		
Butter, baked		
Heated vegetable oil		
Sweet aromatics		
Caramelized		
Vanilla/vanillin		
Almond/cherry		
Molasses		
Other aromatics (baking soda, etc.)		
Sweet		
Salty		
Baking soda feel		

APPENDIX 12.5 SPECTRUM DESCRIPTIVE ANALYSIS: EXAMPLES OF FULL PRODUCT DESCRIPTIONS

A. White Bread

	Standard	Premium
1. Appearance	Golden brown	Golden brown
Color of crust	10	12
Evenness color of crust	12	12
Color of crumb	Yellow	Yellow
Chroma of crumb	10	9
Cell size	7	11
Cell uniformity	12	8
Uniformity of shape	12	9
Thickness	10	7
Distinctiveness of cap	2	7
2. Flavor		
2.1 Aromatics		
Grain complex		
Raw	5.5	7
Cooked	2	0
Browned	1	2.5
Bran	0	0
Dairy/buttery	0	3.5
Soured (milky, cheese, grain)	2.5	0
Caramelized	0	3
Yeasty/fermented	2	4
Plastic	1	0
Chemical leavening	4	0
Baking soda	0	0
2.2 Basic Tastes		
Sweet	2.5	5
Salty	8	7
Sour	3	2
Bitter	1.5	0
2.3 Chemical Feeling Factors		
Metallic	1.5	0
Astringent	3	1.5
Baking soda feel	0	0
3. Texture		
3.1 Surface		
Roughness of crumb	6	5
Initial moistness	6.5	9

(*Continued*)

A. White Bread (Continued)

	Standard	Premium
3.2 First Chew		
Crust firmness	5	3.5
Crust cohesiveness	7	2
Firmness of crumb	3	3.5
Denseness of crumb	3	8
Cohesiveness of crumb	10	6.5
Uniformity of chew	6.5	12
3.3 Chewdown (10 chews)		
Moisture absorption	12	14
Cohesiveness of mass	10	11
Moistness of mass	8	12
Roughness of mass	6	4
Lumpy	5	1.5
Grainy	1	3
Adhesiveness to palate	6	4
Stickiness to teeth	4	2
3.4 Residual		
Loose particles	3	1
Tacky film	2	0

B. Toothpaste

	Standard Mint Paste	Mint Gel
1. Appearance		
Extruded	5	6
Cohesive	9	20
Shape	9	8
Gloss	6.5	15
Particulate	0	0
Opacity	15	2
Color intensity	3.5	9
Chroma	10	12
2. Flavor		
2.1 First Foam		
Mint complex	11	6
Peppermint/menthol	0	6
Spearmint	0	0
Wintergreen	11	0
Brown spice complex	3.5	0

(*Continued*)

B. Toothpaste (Continued)

	Standard Mint Paste	Mint Gel
Cinnamon	1	0
Clove	2	0
Anise	0	3.5
Floral	0	2
Base/chalky	3.5	3
Soapy	1.5	2.5
Sweet	9	9
Salty	2	0
Bitter	3	5
Sour	0	0
2.2 Expectorate		
Minty	7	1.5
Brown spice	1	0
Floral	0	2
Burn	2	4
Cool	9	14
Astringency	4	7
Base	1.5	3
2.3 Rinse		
Brown spice	1.5	0
Fruity	0	0
Minty	3.5	1.5
Base	1.5	2
Salty	0	0
Sweet	4	4
Burn	1.5	2.5
Cool	8	11
Bitter	1.5	4
Soapy	0	1
2.4 Five Minutes		
Fruity	0	0
Minty	3	1
Soapy	1.5	1
Cool	7	6
Bitter	2	5
Brown spice	0	0
Anise	0	3
3. Texture		
3.1 Brush on front teeth 10×		
Firmness	4.5	6

B. Toothpaste (Continued)

	Standard Mint Paste	Mint Gel
Sticky	8	9
3.2 First Foam		
Amount of foam	8	7
Slipperiness of foam	7	4
Denseness of foam	11	9.5
3.3 Expectorate		
Chalky	4.5	7
Slickness of teeth	5	3.5

C. Peanut Butter

	Local Brand	National Brand
1. Appearance		
Color intensity	7.0	7.5
Chroma	5.4	6.0
Gloss	5.2	5.1
Visible particles	2.5	2.0
2. Flavor		
2.1 Aromatics		
Roasted peanut	3.0	6.1
Raw/beany	2.3	1.3
Over roasted	0.6	3.0
Sweet aromatic	3.1	4.5
Woody/hull/skins	4.4	1.6
Fermented fruit	0	0
Phenol	0	0
Cardboard	0.4	0
Burnt	0	0
Musty	0.3	0
Green	0.1	0
Painty	0.1	0
Soy	1.0	0
2.2 Basic Tastes		
Salt	11.9	9.1
Sweet	9.2	7.4
Sour	1.9	1.1
Bitter	3.1	1.6
2.3 Chemical Feeling Factors		
Astringent	2.5	2.0

(*Continued*)

C. Peanut Butter (Continued)

	Local Brand	National Brand
3. Texture		
3.1 Surface		
Surface roughness	2.5	1.3
3.2 First Compression		
Firmness	7.0	5.7
Cohesiveness	6.9	7.0
Denseness	15	15
Adhesive	11.4	9.8
3.3 Manipulation		
Mixes with saliva	8.4	9.9
Adhesiveness of mass	4.9	2.6
Cohesiveness of mass	5.4	4.1
Roughness of mass	1.8	1.0
4. Residual		
Loose particles	0.1	0
Oily film	1.6	1.5
Chalky film	1.7	1.1

D. Mayonnaise

	National Brand Mayonnaise	National Brand Dressing
1. Appearance		
Color	Cream/yellow	White
Color intensity	2	1
Chroma	12	10
Shine	10	12.5
Lumpiness	9	4
Bubbles	5	2
2. Flavor		
2.1 Aromatics		
Eggy	6.8	1.5
Mustard	4.5	3.5
Vinegar	4.5	9
Lemon	3.5	1
Oil	1.5	0
Starchy	0	1.5
Onion	1.5	0
Clove	0	4.8
2.2 Basic Tastes		
Salty	8	7

D. Mayonnaise (Continued)

	National Brand Mayonnaise	National Brand Dressing
Sour	3	8
Sweet	3	8
2.3 Chemical Feeling Factors		
Burn	2	3
Pungent	2	3
Astringent	3.5	6
3. Texture		
3.1 Surface		
Adhesiveness to lips	6	10
3.2 First Compression		
Firmness	8.5	9
Denseness	11	12.5
Cohesiveness	6	10
3.3 Manipulation		
Cohesiveness of mass	7	8.5
Adhesiveness of mass	7	5
Mixes with saliva	11.5	8
3.4 Residual		
Oily film	4	1.5
Tackiness	0	0
Chalkiness	0	1

E. Marinara Sauce

	Shelf-Stable (Jar)	Fresh–Refrigerated
1. Appearance		
Color	Red/orange	Red/orange
Color intensity	11	13
Chroma	12	8
Shine	7.5	7.5
Total particles		
Micro particles	10	8
Macro particles	5	12
2. Flavor		
2.1 Aromatics		
Tomato complex	8	7
Raw	1.5	5
Cooked	6.8	3

(*Continued*)

E. Marinara Sauce (Continued)

	Shelf-Stable (Jar)	Fresh–Refrigerated
Tomato character (Seedy/ skin, red fruity, viney, skunky)	8	7
Fermented/soured	0	0
Caramelized	4	2
Vegetable complex		
Bell pepper, mushroom, other	2	4
Onion/garlic	5	6.5
Green herbs complex		
Oregano, basil, thyme	5	7.8
Black pepper	1.5	4
Cheese/Italian	3.5	1
2.2 Basic Tastes		
Sweet	7	5.5
Sour	2.5	2
Salty	9	7
2.3 Chemical Feeling Factors		
Astringent	4	4.5
Heat	1.5	4
3. Texture		
3.1 First Compression		
Cohesiveness	3	1
Pulpy matrix/base	5.5	9.5
3.2 Manipulation		
Amount of particles/chunks	4	10
Largest size	3	8
Smallest size	1	2.5
3.3 Chew Particles		
Hardness	3	5.5
Crispness	2	6
Fibrousness (vegetables & herbs)	4	5
3.4 Manipulate Five Times		
Mixes with saliva	11	12
4. Residual		
Oily mouthcoat	2	4
Loose particles	1	4

APPENDIX 12.4 SPECTRUM DESCRIPTIVE ANALYSIS: PRODUCT LEXICONS

A. White Bread Flavor

1. Aromatics
   - Grain Complex
     - Raw white wheat (dough)
     - Cooked white wheat
     - Toasted
     - Cornstarch
     - Whole grain
   - Yeasty/fermented
   - Dairy complex
     - Milk, cooked milk
     - Buttery, brown butter
   - Eggy
   - Sweet Aromatic Complex:
     - Caramelized/honey/malty/fruity
   - Mineral: inorganic, stones, cement, metallic
   - Baking soda
   - Vegetable oil

   Other Aromatics: Mushroom, carrot, earthy, fermented, acetic, plastic, cardboard, chemical leavening

2. Basic Tastes
   - Salty
   - Sweet
   - Sour
   - Bitter

3. Chemical Feeling Factors
   - Metallic
   - Astringent/drying
   - Phosphate
   - Baking soda feel

B. White Bread Texture

1. Surface
   - Crumb texture
     - Roughness
     - Loose particles
     - Moistness
   - Crust Texture
     - Roughness
     - Loose particles
     - Moistness

2. First Chew
   - Crumb denseness
   - Crumb cohesiveness
   - Crumb firmness
   - Crust hardness
   - Crust denseness
   - Crust cohesiveness

3. Partial Compression
   - Crumb springiness

4. Chew down
   - Moisture absorption
   - Moistness of mass
   - Adhesive to palate
   - Cohesiveness of mass
   - Lumpy
   - Grainy

5. Residual
   - Loose particles
   - Toothstick
   - Toothpack
   - Tacky film

C. Toothpaste Flavor

1. Before Expectoration Aromatics
   - Mint complex
     - Peppermint/menthol
     - Spearmint
     - Wintergreen
   - Base/chalky
   - Bicarbonate
   - Anise
   - Fruity
   - Brown Spice
   - Citrus
   - Soapy

2. After Rinsing Aromatics
   - Minty
   - Fruity
   - Brown spice
   - Anise

3. Basic Tastes
   - Sweet
   - Bitter
   - Salty

4. Chemical Feeling Factors
   - Burn
   - Bicarbonate feel
   - Cool
   - Astringent
   - Metallic

D. Toothpaste Texture

1. Brush on front teeth 10 times
   - Firmness
   - Sticky
   - Number of brushes to foam
   - Ease to disperse
   - Denseness of foam
2. Expectorate
   - Chalky
   - Gritty
   - Slickness of teeth

3. 20 Brushes (back teeth)
   - Grittiness between teeth
   - Amount of foam
   - Slipperiness of foam

4. Rinse
   - Slickness of teeth

E. Potato Chip Flavor

1. Aromatics
   - Potato complex
     - Raw potato/green
     - Cooked potato
     - Browned
     - Dehydrated
   - Earthy/potato skins

2. Basic Tastes
   - Salty
   - Sweet
   - Sour
   - Bitter

Sweet potato

Oil complex
- Heated vegetable oil
- Overheated/abused oil

Sweet caramelized
Cardboard
Painty
Spice

3. Chemical Feeling Factors
   Tongue burn
   Astringent

F. Potato Chip Texture

1. Surface
   Oiliness
   Roughness, macro
   Roughness, micro
   Loose Crumbs

2. First Bite/First Chew
   Hardness
   Crispness
   Denseness
   Particles after 4–5 chews

3. Chewdown
   Moisture absorption
   # Chews to bolus
   Persistence of crisp
   Abrasiveness of mass
   Moistness of mass
   Cohesiveness of mass

4. Residual Toothpack
   Chalky mouthcoat
   Oily film

G. Mayonnaise Flavor

1. Aromatics
   Vinegar (type)
   Cooked egg/eggy
   Dairy milky/cheesy/butter
   Mustard (type)
   Onion/garlic
   Lemon/citrus
   Pepper (black/white)
   Lemon juice
   Fruity (grape/apple)
   Brown spice (clove)
   Paprika
   Vegetable oil (aromatic)
   Other aromatics: Cardboard (stale oil), starch, paper, nutty/woody, sulfur, painty (rancid oil), caramelized, fishy

2. Basic Tastes
   Salty
   Sweet
   Sour
   Bitter

3. Chemical Feeling Factors
   Astringent
   Tongue burn/heat
   Prickly/pungent

H. Mayonnaise Texture

1. Surface Compression
   - Slipperiness

2. First Compression
   - Firmness
   - Cohesiveness
   - Stickiness to palate

3. Manipulation
   - Cohesiveness of mass
   - Lumpy mass
   - Adhesive mass
   - Rate of breakdown

4. Residual
   - Oily film
   - Sticky/tacky film
   - Chalky film

I. Corn Chip Flavor

1. Aromatics
   - Corn Complex
     - Raw corn
     - Cooked corn
     - Toasted/browned corn
     - Masa/fermented
   - Caramelized
   - Oil Complex
     - Heated oil
     - Heated corn oil
     - Hydrogenated
   - Other grain (type)
   - Burnt
   - Earthy/green husks

2. Basic Tastes
   - Salty
   - Sweet
   - Sour
   - Bitter

3. Chemical Feeling Factors
   - Astringent
   - Burn

J. Corn Chip Texture

1. Surface
   - Roughness, macro
   - Roughness, micro
   - Manual oiliness
   - Oiliness on lips
   - Loose particles

2. First bite/first chew
   - Hardness
   - Crispness/crunchiness
   - Denseness
   - Amount of particles

3. Chewdown
   - Moisture absorption
   - # Chews to bolus
   - Moistness of mass
   - Persistence of crunch/crisp
   - Cohesiveness of mass
   - Graininess of mass

4. Residual
   - Toothpack
   - Grainy particles
   - Chalky mouthfeel
   - Oily/greasy mouthfeel

K. Cheese Flavor

1. Aromatics
   - Dairy complex
     - Milky
     - Cooked milk/caramelized
     - Dairy fat
     - Non-Fat Dry Milk (NFDM)
     - Cheesy
     - Cultured dairy complex
     - Sour cream/buttermilk
     - Cottage cheese
     - Yogurt
   - Cheese acids complex
     - Butyric
     - Propionic
     - Isovaleric
     - Caproic/caprylic
   - Smoky
   - Nutty/woody
   - Fruity
     - Tropical
   - Herb complex
   - Musty/moldy
   - Degraded protein/casein/animal
   - Para-cresol/barnyard
   - Plastic/vinyl
   - Cardboard

2. Basic Tastes
   - Sweet
   - sour
   - Salty
   - Bitter

3. Chemical Feeling Factors
   - Astringent
   - Bite/sharp
   - Burn/heat
   - Nasal pungency

L. Cheese Texture

1. Surface
   - Rough macro-bumpy
   - Rough micro-grainy/gritty or chalky
   - Wetness
   - Oily/fatty
   - Loose particles

2. First Bite/First Chew
   - Firmness
   - Hardness
   - Denseness
   - Cohesiveness
   - Toothstick
   - Number of pieces

4. Chewdown
   - Mixes with saliva
   - Rate of melt
   - Cohesiveness of mass
   - Moistness of mass
   - Adhesiveness of mass
   - Lumpiness of mass
   - Grainy mass
   - Toothstick

5. Residual
   - Toothstick
   - Mouthcoat
   - Oily film

3. Partial Compression
   Springiness
   Particles left
   Chalky film
   Tacky
   Dairy film
   Sticky film

M. Caramel/Confections Flavor

1. Aromatics
   Caramelized sugar
   Dairy complex
      Baked butter
      Cooked milk
   Sweet Aromatics
      Vanilla
      Vanillin
   Diacetyl
   Scorched
   Yeasty (dough)

Other aromatics: cellophane, phenol, cardboard, painty

2. Basic Tastes
   Sweet
   Sour
   Salty

3. Chemical Feeling Factors
   Tongue burn

N. Caramel Texture

1. Surface
   Lipstick
   Moistness
   Roughness

2. First Bite/First Chew
   Hardness
   Denseness
   Cohesiveness
   Toothstick

3. Chewdown
   # of chews to bolus
   Mixes with saliva
   Cohesiveness of mass
   Moistness of mass
   Roughness of mass
   Toothpull
   Adhesiveness to palate
   # of chews to Swallow

4. Residual
   Oily/greasy film
   Tacky film
   Toothstick

O. Chocolate Chip Cookie Flavor

1. Aromatics
   - White wheat complex
     - Raw white wheat
     - Cooked white wheat
     - Toasted/browned
   - Chocolate/cocoa complex
     - Chocolate
     - Cocoa
   - Dairy complex
     - NFDM
     - Baked butter
     - Cooked milk
   - Sweet aromatics complex
     - Brown sugar/molasses
     - Vanilla, vanillin
     - Caramelized
     - Coconut
   - Nutty
   - Fruity
   - Baked egg
   - Shortening (heated oil, hydrogenated vegetable fat)
   - Baking soda
   - Cardboard

2. Basic Tastes
   - Sweet
   - Salty
   - Bitter

3. Chemical Feeling Factors
   - Burn

P. Chocolate Chip Cookie Texture

1. Surface
   - Roughness, micro
   - Roughness, macro
   - Loose crumbs/particles
   - Oiliness
   - Surface moisture

2. First Bite/First Chew
   - Firmness/hardness
   - Crispness
   - Denseness
   - Cohesiveness
   - Crumbly

3. Chewdown
   - # chews to bolus
   - Moisture absorption
   - Cohesiveness of mass
   - Moistness of mass
   - Awareness of chips
   - Roughness of mass
   - Persistence of crisp

4. Residual
   - Toothpack
   - Toothstick
   - Oily/greasy film
   - Grainy particles
   - Loose particles
   - Mouthcoating

Q. Spaghetti Sauce Flavor

1. Aromatics
   - Tomato complex
     - Raw
     - Cooked
   - Tomato character
     - Seedy/skin
     - Fruity
     - Fermented/soured
     - Viney
     - Skunky
   - Caramelized
   - Vegetable complex
     - Bell pepper, mushroom, other
   - Onion/garlic
   - Green herb complex
     - Oregano, basil, thyme
   - Black pepper
   - Cheese/Italian
   - Other
     - Fish, meat, metallic

2. Basic Tastes
   - Salty
   - Sweet
   - Sour
   - Bitter

3. Chemical Feeling Factors
   - Astringent
   - Heat
   - Bite

R. Spaghetti Sauce Texture

1. Surface
   - Wetness
   - Oiliness
   - Particulate

2. First Compression
   - Viscosity/Thickness
   - Cohesiveness
   - Pulpy matrix/base
     - Amount
     - Size
   - Amount of large particles
   - Amount of small particles

3. Manipulation
   - Amount of particles/chunks
     - Largest size
     - Smallest size
   - Chew particles
     - Hardness
     - Crispness
     - Fibrousness (vegetables and herbs)

Manipulate 5 times
   - Mixes with saliva
   - Amount of particles

4. Residual
   - Oily mouthcoat
   - Loose particles

S. Facial Wipes Handfeel Texture

1. Surface
   - Amount of Product
   - Gritty
   - Grainy
   - Lumpy
   - Fuzzy
   - Slipperiness
   - Thickness

2. Manipulation
   - Force to Gather
   - Stiffness
   - Fullness/Body

T. Facial Wipes Skinfeel Appearance and Texture

1. In Use
   - Amount of lather (visual)
   - Bubble size (visual)
   - Bubble size variation (visual)
   - Thickness of lather

2. Before Drying
   - Rinsability
   - Stickiness
   - Slipperiness
   - Amount of residue
   - Type of residue

3. After Feel
   - Cool
   - Gloss (visual)
   - Facial lines/creases (visual)
   - Stickiness

   - Slipperiness
   - Amount of residue
   - Type of residue
   - Skin roughness
   - Moistness
   - Tautness

U. Mascara Evaluation

1. Baseline and wear
   - Lash visibility
   - Color intensity base/tips
   - Length
   - Thickness
   - Density
   - Degree of lash curl
   - Gloss
   - Tangling
   - Separation

2. Application
   - Ease of application (strokes)

3. Wear (multiple time points)
   - Lash wetness
   - Top/bottom lash stickiness
   - Transfer
   - Color intensity base
   - Color intensity tips
   - Length
   - Thickness
   - Density
   - Degree of lash curl
   - Gloss
   - Tangling
   - Separation
   - Clumping
   - Spiking
   - Fibers
   - Beading
   - Flaking
   - Smudging

V. Fragrance

Floral
White flower
Rose
Muguet
Violet
Floral/other
Citrus
Aldehydic
Fruity
Stone Fruit
Berry
Melon
Tropical
Fruit other
Fougere
Pine
Spice
Black
Brown
Sweet
Amber
Caramelized
Vanillin
Powdery
Camphor
Herbaceous
Woody
Resinous
Green
Moss/chypre
Ozonic/marine
Animal

APPENDIX 12.3 STREAMLINED APPROACH TO SPECTRUM REFERENCES

Central to the Spectrum method is the use of intensity references. During training, Spectrum panelists are typically oriented to dozens of intensity references for flavor and texture. However, time or budget constraints often lead companies to seek ways to reduce the volume of references used, or panel leaders desire a smaller set of references for daily panel use. Also, many panels are more comfortable using references within product categories they typically evaluate. To address this, Sensory Spectrum has developed a streamlined approach to Spectrum references using a dozen foods commonly available in the United States. These 12 products can serve as the building blocks for flavor and texture intensity references and provide a panel leader with readily available reference products requiring minimal preparation. Since the Spectrum method does not depend on the availability of a single reference product, references that best meet the needs of the panel should be selected. The list below is intended to represent the average attribute intensity values for those products. Slight product variability and individual differences in panelist sensitivity (ex. bitterness) are expected. A panel leader might select 3–7 products to use regularly, providing panelists with the in-context references they tend to crave. In addition, Sensory Spectrum advocates the selection of panel specific internal control products for which complete profiles are developed then presented and reviewed at each panel session as a tool to standardize the panel's scores and minimize intensity drift. This approach is commonly used in Spectrum skinfeel panels.

1. Pepperidge Farm Bordeaux Cookies

AROMATICS	
Total impact	7.0
Grain complex	3.0
Toasted grain	3.0
Dairy complex	1.5
Butter/milk fat	1.5
Sweet aromatics	5.0
Vanilla/vanillin	1.0
Caramelized	4.5
Basic Tastes	
Sweet	12.5
Salt	4.0
TEXTURE	
Surface	
Microroughness	10.0
Macroroughness	3.0
Loose particles	5.0
Oily lips	2.0
Chewdown	
Hardness	8.0

Crispness	8.0
Denseness	7.0
Moisture absorption	10.0
Cohesiveness of mass	2.0
Roughness of mass	9.0 Gritty/coarse
Moistness of mass	10.0
Persistence of crisp	8.0
Dissolvability	7.0
Residual	
Toothpack	5.0
Loose particles	3.5

2. Sara Lee All Butter Pound Cake

Thawed in refrigerator, edges/crust removed, room temperature

AROMATICS	
Total impact	6.8
White wheat complex	2.5
Cooked white wheat	2.5
Eggy	1.5
Sweet aromatics	4.0
Caramelized	1.5
Vanilla	2.5
Dairy complex	2.0
Butterfat	2.0
Basic Tastes	
Sweet	10.5
Salt	3.5
TEXTURE	
Surface (crumb)	
Microroughness	4.5
Loose particles	5.0
Oily lips	2.5
Partial Compression	
Springiness	9.0
First Bite	
Hardness	3.5
Uniformity of bite	14.0
First Chew	
Denseness	7.0
Cohesiveness	5.5
Chewdown (10 chews)	
Moisture absorption	13.0

Cohesiveness of mass	8.5
Moistness of mass	10.0
Roughness of mass	4.0 grainy
Adhesiveness to palate	2.0
Residual	
Loose particles	3.5
Mouthcoating	5.0
Oily/greasy	2.5
Chalky	2.5
Toothstick	1.0

3. Skippy Creamy Peanut Butter

AROMATICS	
Total impact	8.0
Peanut complex	6.0
Roasted peanut	4.0
Woody/hulls/skins	2.0
Basic Tastes	
Sweet	7.5
Sour	1.0
Salt	9.0
Bitter	2.0
Chemical Feeling Factors	
Astringent	2.0
TEXTURE	
Semisolid First Compression	
Firmness	11.0
Cohesiveness	11.0
Denseness	15.0
Chewdown	
Grit between teeth	1.0
Adhesiveness to palate	12.0
Mixes with saliva	7.0
Cohesiveness of mass	7.0
Roughness of mass	1.0
Residual	
Film	10.0 Oily/particulate

4. Hellmann's Mayonnaise
Room temperature

AROMATICS	
Total impact	7.0
Eggy	5.5
Mustard	4.0
Vinegar	4.0
Lemon	2.0
Vegetable oil	2.0
Onion	1.0
Basic Tastes	
Sweet	4.0
Sour	4.5
Salt	12.0
Chemical Feeling Factors	
Burn	1.5
Astringent	3.5
TEXTURE	
Surface	
Slipperiness	12.5
Firmness	3.5
Denseness	9.0
Cohesiveness	7.0
Mixes with saliva	10.5
Cohesiveness of mass	6.0
Adhesiveness of mass	7.0
Residual	
Oily film	5.0

5. **Land O'Lakes American Cheese (from Deli or Local Grocer)**
½″ cubes; Note: If sourced from other merchandiser, please contact us for alterations to various texture scales.

AROMATICS	
Total impact	7.0
Dairy complex	6.0
Cooked milky	3.0
Butter fat	1.0
Soured/cheesy/butyric	3.0
Nutty	2.0
Basic Tastes	
Sweet	3.5

Sour	4.5
Salt	14.0
Chemical Feeling Factors	
Astringent	2.5
TEXTURE	
Surface	
Roughness	0.0
Moistness	2.5
Partial Compression	
Springiness	0.8
First Bite/Chew	
Hardness	4.5
Denseness	15.0
Cohesiveness	4.5
Chewdown	
Mixes with saliva	5.5
Cohesiveness of mass	10.0
Moistness of mass	9.0
Adhesiveness to palate	4.0
Roughness of mass	3.0 Lumpy
Toothstick	9.0
Residual	
Toothpack	2.0
Mouthcoating	2.5
Dairy film	2.0

6. Lay's Classic Potato Chips

AROMATICS	
Total impact	6.9
Potato complex	4.8
Cooked potato	3.1
Browned/toasted/caram. Potato	1.5
Earthy/skins	*0, but 1.0 if present on individual chips
Heated oil	2.2
Basic Tastes	
Salt	13.5
Sweet	3.8
Sour	1.1
Bitter	0.8
TEXTURE	
Surface	

Microroughness	7.0
Macroroughness	2.5
Oily lips	6.3
Manual oiliness	5.7
Manual particles	5.2
First Chew	
Hardness	5.4
Denseness	5.8
Fracturability	5.7
Chewdown	
Persistence of crisp/crunch	10.0
Moisture absorption	10.1
Moistness of mass	8.4
Cohesiveness of mass	6.8
Roughness of mass	6.0
Grainy	5.0
Lumpy	1.0
Toothstick	2.3
Residual	
Toothpack/toothstick	4.8
Oily film/residue	3.0
Loose particles	2.4

7. Minute Maid Orange Juice: Frozen Concentrate Reconstituted

AROMATICS	
Total impact	7.5
Orange complex	7.5
Raw	1.0
Cooked	5.0
Expressed orange oil	2.0
Other citrus	1.0
Basic Tastes	
Sweet	8.0
Sour	3.8
Bitter	1.5
Chemical Feeling Factors	
Astringent	2.5
Burn	2.0
TEXTURE	
Viscosity	2.0
Particulates	1.5
Mixes with saliva	12.0

8. Oscar Meyer Beef Hot Dogs

AROMATICS	
Total impact	8.0
Cured meat complex	4.0
Beef/pork	4.0
Smoke	2.5
Spice complex	2.0
Brown spice complex	2.0
Garlic	2.5
Basic Tastes	
Salt	16.0
Sweet	4.0
Sour	2.0
TEXTURE	
Surface (skin)	
Moisture	3.5
Roughness	2.0
Oiliness	3.0
First Chew (with molars)	
Springiness	6.0
First Bite/Chew	
Firmness	7.0
Cohesiveness	6.0
Denseness	9.5
Juiciness	8.0
Chewdown (10 chews)	
Cohesiveness of mass	5.5
Moistness of mass	9.0
Skin awareness	5.0
Roughness of mass	6.0
Residual	
Oily/greasy	4.0
Loose particles	3.0

9. DeCecco Spaghetti (12 min cook)

AROMATICS	
Total impact	4.5
White wheat complex	4.5
Raw white wheat	0.5
Cooked white wheat	4.0

Basic Tastes	
Sweet	1.5
Salt	1.0
TEXTURE	
Surface	
Wetness	1.0
Microroughness	1.0
Stickiness	7.0
First Chew	
Hardness	6.0
Denseness	15.0
Cohesiveness	7.0
Toothpull	3.0
Chewdown	
Mixes with saliva	3.0
Cohesiveness of mass	2.0
Geometrical of mass	Beady/grainy
Residual	
Loose particles	2.0
Chalky film	2.0
Toothstick	2.0

10. Heinz Tomato Ketchup

AROMATICS	
Total impact	9.0
Tomato complex	5.0
Cooked tomato	5.0
Vinegar	3.8
Green herb complex	3.0
Celery	3.0
Brown spice complex	5.5
Clove	5.0
Black pepper	3.0
Sweet aromatics	3.8
Caramelized	3.8
Cooked onion	2.0

Basic Tastes	
Sweet	9.5
Sour	5.8
Salt	11.5
Bitter	1.5
Chemical Feeling Factors	
Astringent	5.0
Burn	2.0
TEXTURE	
Surface	
Slipperiness	8.0
First Manipulation	
Firmness	2.0
Cohesiveness	4.5
Manipulation (5)	
Mixes with saliva	14.0
Cohesiveness of mass	2.5
Adhesiveness of mass	2.5

11. Häagen-Dazs Vanilla Ice Cream

AROMATICS	
Total impact	8.0
Dairy complex	4.0
Cooked	2.0
Butter fat	2.0
Eggy (cooked)	2.0
Vanilla impression	4.8
Vanillin	1.0
Bourbon/alcohol	2.0
Dried fruit	2.5
Basic Tastes	
Salt	2.0
Sweet	12.0
Sour	1.5
Bitter	0.0

TEXTURE	
First Compression	
Semisolid firmness	8.5
Semisolid denseness	14.0
Slipperiness	13.0
Manipulation (5)	
Mixes with saliva	13.0
Viscosity of liquid	2.0
Manipulations to melt	5.0
Residual	
Fatty/oily film	2.0
Dairy film	2.0

12. Yoplait Original Strawberry Yogurt

AROMATICS	
Total impact	7.5
Dairy complex	3.5
Cultured dairy	2.5
Cooked dairy	1.0
Strawberry complex	5.0
Cooked strawberry	2.0
Ethyl maltol	3.0
Basic Tastes	
Sweet	11.0
Sour	3.0
Chemical Feeling Factors	
Astringent	4.0
TEXTURE	
Compression	
Semisolid firmness	4.0
Semisolid cohesiveness	6.0
Semisolid denseness	15.0
Manipulation (5)	
Mixes with saliva	8.5
Particulate	4.0
Chalky	3.0
Lumpy	1.0
Residual	
Fatty/oily film	1.0
Chalky film	3.0

6. Evaluation after 30 Min
Place a swatch of black fabric over test site. Fold arm so fingertips touch the shoulder. With arm still folded, pull fabric from crook of arm. Compare residue on swatch to visual scale provided.

a. Rub-off whitening	The amount of residue on the dark fabric: [None ---------- Large amount]

APPENDIX 12.2 SPECTRUM INTENSITY SCALES FOR DESCRIPTIVE ANALYSIS

The scales below (all of which run from 0 to 15) contain intensity values for aromatics (A) and for tastes (B) that were derived from repeated tests with trained panels at Hill Top Research, Inc., Cincinnati, Ohio, and with trained panels at Sensory Spectrum; and also for various texture characteristics (C and D) that were obtained from repeated tests at Hill Top Research or at Sensory Spectrum, or that were developed at Bestfoods Technical Center, Somerset, New Jersey.

New panels can be oriented to the use of the 0–15 scale by presentation of the basic tastes using concentrations of caffeine, citric acid, NaCl, and sucrose, which are listed under Section B. If a panel is developing a descriptive system for an orange drink product, the panel leader can present three "orange" references:

1. Orange drink Hi-C labeled "Orange Complex 3.0"
2. Reconstituted Minute Maid concentrate labeled "Orange Complex 7.5 and Orange Peel 2.0"
3. Tang labeled "Orange Complex 9.5 and Orange Peel 4.0"

At each taste test of any given product, labeled reference samples related to its aromatic complex can be presented so as to standardize the panel's scores and keep panel members from drifting.

A Intensity Scale Values (0–15) for Some Common Aromatics

Term	Reference	Scale Value
Baked white wheat	Ritz crackers (Nabisco)	6.5
Caramelized sugar	Tortilla chips (Frito Lay)	2
	Ketchup (Heinz)	3
	Bugles (General Mills)	4
	Bordeaux cookies (Pepperidge Farm)	4.5
Celery	V-8 vegetable juice (Campbell)	5
Cheese	American cheese, slices (Kraft Singles)	5
Cinnamon	Big Red gum (Wrigley)	12.5

(*Continued*)

A Intensity Scale Values (0–15) for Some Common Aromatics (Continued)

Term	Reference	Scale Value
Coffee impact	Coffee (Maxwell House)	3
Cooked apple	Applesauce, natural (Mott's)	5
Cooked orange	Frozen orange concentrate (Minute Maid)—reconstituted	5
Cooked white wheat	Pound cake (Sara Lee)	2
Egg	Mayonnaise (Hellmann's)	5
Grain complex	Wheatina cereal	9
	Triscuit (Nabisco)	8
	Ritz cracker (Nabisco)	6.5
	Cream of Wheat (Nabisco)	4.5
	Penne, whole grain pasta (Barilla) cooked, chilled	4
	Penne white pasta (Barilla) cooked, chilled	3
Grape	Kool-Aid, grape	5
	Grape juice (Welch's Concord)	10
Lemon	Lemonade (Country Time)	5
Milky complex	American cheese, slices (Kraft Singles)	3
	Powdered milk (Carnation)	4
	Whole milk	5
Mint	Doublemint gum (Wrigley)	11
Oil	Potato chips (Pringles)	1
	Soybean oil (Crisco Vegetable Oil)	2
	Heated oil (Crisco Vegetable Oil)	4
Orange complex	Orange drink (Hi-C)	3
	Frozen orange concentrate (Minute Maid)—reconstituted	7
	Orange concentrate—reconstituted (Tang)	9.5
Orange peel	Soda (Orange Crush)	2
	Frozen orange concentrate (Minute Maid)—reconstituted	2
	Orange concentrate—reconstituted (Tang)	4
Peanut	Medium roasted regular cocktail peanuts (Planters)	7
Potato	Potato chips (Pringles)	4.5
Vanillin	Powdered doughnut (Hostess)	2
	Honey bun (Little Debbie)	2.5

B Scales Values (0–15) for the Four Basic Tastes

	Sweet	Salt	Sour	Bitter
American cheese, slices (Kraft)		7	5	
Applesauce, natural (Mott's)	5		4	
Applesauce, regular (Mott's)	8.5		2.5	
Big Red gum (Wrigley)	11.5			
Bordeaux cookies (Pepperidge Farm)	11.5			
Basic taste blends				
5% Sucrose/0.1% Citric acid	6		7	
5% Sucrose/0.55% NaCl	7	9		
0.1% Citric acid/0.55% NaCl		11	6	
5% Sucrose/0.1% Citric Acid/0.35% NaCl	5	5	3.5	
5% Sucrose/0.1% Citric acid/0.55% NaCl	4	11	6	
Caffeine, solution in water				
0.05%				2
0.08%				5
0.15%				10
0.20%				15
Celery seed				9
Chocolate bar (Hershey's)	10		5	4
Citric acid, solution in water				
0.05%			2	
0.10%			5	
0.15%			10	
0.20%			15	
Coca-Cola Classic	9			
Endive, raw				7
Fruit punch (Hawaiian)	10		3	
Grape juice (Welch's Concord)	6		7	2
Grape Kool-Aid	10		1	
Kosher dill pickle (Vlasic)		12	10	
Lemon juice (ReaLemon)			15	
Lemonade (Country Time)	7		5.5	
Mayonnaise (Hellmann's)		12	4.5	
NaCl, solution in water				
0.2%		2		
0.35%		5		
0.55%		10		
0.7%		15		
Soda (Orange Crush)	10		2	
Frozen orange concentrate (Minute Maid)—reconstituted	7.5		3.5	
Orange concentrate—reconstituted (Tang)	9			

B Scales Values (0–15) for the Four Basic Tastes (Continued)

	Sweet	Salt	Sour	Bitter
Potato chips (Lay's)	3.8	13.5		
Potato chips (Pringles)	6	13		
Snack cracker (Ritz)	4	8		
Soda cracker (Premium)		5		
Spaghetti sauce (Ragu)	8	12		
Sucrose, solution in water				
2.0%	2			
5.0%	5			
10.0%	10			
16.0%	15			
Sweet pickle (Gherkin, Vlasic)	8.5		8	
Orange concentrate—reconstituted (Tang)	11.5		5	
V-8 vegetable juice (Campbell)		8		
Wheatina cereal		6		2.5
Whole grain wheat cracker (Triscuit)		9.5		

C Intensity Scale Values (0–15) for Semisolid Oral Texture Attributes

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
1. Slipperiness			
2.0	Classic hummus	Sabra	1 oz.
3.5	Baby food—peas	Beechnut Stage 2	1 oz.
7.5	Chocolate pudding, instant, made with whole milk	Jello	1 oz.
12.0	Sour cream, full fat	Breakstone	1 oz.
2. Firmness			
3.0	Aerosol whipped cream	Reddi-Wip (Con Agra)	1 oz.
5.0	Miracle Whip	Kraft Foods	1 oz.
9.0	Cheez Whiz	Kraft Foods	1 oz.
11.0	Peanut butter	Hormel/Skippy	1 oz
13.0	Cream cheese	Kraft/Philadelphia	1 oz.
3. Cohesiveness			
2.0	Instant gelatin dessert	Jello, Kraft Foods	½ in. cube
6.5	Instant vanilla pudding	Jello, Kraft Foods made with whole milk	1 oz.
10	Baby food—bananas	Gerber, Stage 1	1 oz.
14.0	Tapioca pudding	SnackPack shelf stable (Con Agra)	1 oz.

(*Continued*)

C Intensity Scale Values (0–15) for Semisolid Oral Texture Attributes (Continued)

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
4. Denseness			
2.5	Aerosol whipped cream	Reddi-wip	1 oz.
5.0	Mousse mix	Oetker Milk Chocolate Mousse Mix made with whole milk	1 oz.
7.0	Marshmallow Fluff	Fluff-Durkee-Mower	1 oz.
9.0	Whipped cream cheese	Kraft Foods/Philadelphia	1 oz.
15.0	Block cream cheese	Kraft Foods/Philadelphia	½ in. cube
5. Amount of Particles			
2.5	1 c. refrigerated chocolate pudding + ½ t. yellow corn meal	Kozy Shack or equivalent, Quaker yellow corn meal or equivalent	1 oz.
6.0	1 c. refrigerated chocolate pudding + 1 t. yellow corn meal	Kozy Shack or equivalent, Quaker yellow corn meal or equivalent	1 oz.
8.0	1 c. refrigerated chocolate pudding + 1½ t. yellow corn meal	Kozy Shack or equivalent, Quaker yellow corn meal or equivalent	1 oz.
10.0	1 c. refrigerated chocolate pudding + 2 t. yellow corn meal	Kozy Shack or equivalent, Quaker yellow corn meal or equivalent	1 oz.
6. Particle size			
4.0	Small pearl tapioca*		2 oz.
8.0	Boba Tea tapioca	Pearl Milk Tea Tapioca or Bubble Tea	2 oz.
15.0	Large tapioca balls*		2 oz.
7. Amount of Mouthcoating Film of Liquids			
3.0	Whole milk		1 oz.
6.0	Maple-type syrup	Log Cabin Original Syrup	1 oz.
7.5	Heavy cream		1 oz.

* Contact Sensory Spectrum for details on sample preparation.

D Intensity Scale Values (0–15) for Solid Oral Texture Attributes

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
1. Standard Surface Roughness Scale[a]			
0.0	Gelatin dessert	Jello	2 tbsp
5.0	Orange peel	Peel from fresh orange	½ in. piece
8.0	Potato chips	Pringles	5 pieces
12.0	Hard granola bar	Nature Valley Oats n Honey	½ bar
15.0	Rye wafer	Finn Crisp/Vaasan OY	½ in. sq.

D Intensity Scale Values (0–15) for Solid Oral Texture Attributes (Continued)

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
Technique:	Place sample against lips; feel the surface to be evaluated with the lips and tongue.		
Definition:	The overall amount of small and large particles in the surface.		
	[Smooth ---------- Rough]		
2. Standard Surface Moisture Scale			
0.0	Unsalted premium cracker	Nabisco	1 cracker
3.0	Carrots	Uncooked, fresh, unpeeled	½ in. slice
7.5	Apples	Red Delicious, uncooked, fresh, unpeeled	½ in. slice
10.0	Ham	Oscar Mayer Chopped Ham	½ in. piece
15.0	Water	Filtered, room temp.	½ tbsp
Technique:	Hold the sample against lips; evaluate the amount of moisture on sample.		
Definition:	The amount of moisture (oil or water) on the surface.		
	[Dry ---------- Wet]		
3. Standard Stickiness to Lips Scale			
1.0	Cherry tomato	Uncooked, fresh, unpeeled	½ in. slice
4.0	Nougat center (Remove chocolate first)	Three Musketeers/Mars	½ in. cube
7.5	Pretzel rod	Bachman	1 piece
15.0	Rice Krispies	Kellogg's	1 tsp
Technique:	Moisten lips by running tongue over lips. Hold sample near mouth; compress sample lightly between lips and release.		
Definition:	The degree to which the sample adheres to the lips.		
	[None ---------- High adhesion]		
4. Standard Springiness Scale			
0.0	Cream cheese	Kraft Foods/Philadelphia	½ in. cube
5.0	Frankfurter	Cooked 5 min/Hebrew National Beef	½ in. slice
9.0	Marshmallow	Miniature marshmallow/Kraft Foods	3 pieces
15.0	Gelatin dessert	Jello, Knox (see Note)	½ in. cube
Technique:	Place sample between molars; compress partially without breaking the sample structure; release.		
Definition:	(1) The degree to which sample returns to original shape or		
	(2) The rate with which sample returns to original shape.		
	[No recovery ---------- Very springy]		

Note: One package Jello and one package Knox gelatin are dissolved in 1½ cups hot water and refrigerated for 24 h.

[a] The roughness scale measures the amount of irregular particles in the surface. These may be small (chalky, powdery), medium (grainy), or large (bumpy).

D Intensity Scale Values (0–15) for Solid Oral Texture Attributes (Continued)

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
5. Standard Hardness Scale			
1.0	Cream cheese	Kraft Foods/Philadelphia block cream cheese	½ in. cube
4.5	Cheese	Yellow American pasteurized process-deli/Land O'Lakes	½ in. cube
7.0	Frankfurter	Large, cooked 5 min/Hebrew National Beef	½ in. slice
9.0	Peanuts	Cocktail type in vacuum tin/Planters	1 nut, whole
11.0	Almonds	Shelled/Planters or Blue Diamond	1 nut
14.5	Hard candy	Life Savers	3 pieces, one color
Technique:	For solids, place food between the molars and bite down evenly, evaluating the force required to compress the food. For semisolids, measure hardness by compressing the food against palate with tongue once. When possible, the height for hardness standards is ½ in.		
Definition:	The force to attain a given deformation, such as • Force to compress between molars, as above • Force to compress between tongue and palate • Force to bite through with incisors [Low force ("Soft") ——————————————————High force ("Hard")]		
6. Standard Cohesiveness Scale			
1.0	Corn muffin	Jiffy Standard Cornbread Recipe	½ in. cube
4.5	Cheese	Yellow American pasteurized process-deli/Land O'Lakes	½ in. cube
8.0	Pretzel	Soft pretzel—any frozen, baked	½ in. piece
10.0	Dried fruit	Sun-dried seedless raisins/Sun-Maid	1 tsp
12.5	Candy chews	Starburst/Mars	1 piece
15.0	Chewing gum	Freedent/Wrigley	1 stick
Technique:	Place sample between molars; compress fully (can be done with incisors).		
Definition:	The amount to which sample deforms rather than crumbles, cracks, or breaks. [Crumbles——————————————————————Deforms]		
7. Standard Fracturability Scale			
1.0	Corn muffin	Jiffy Mix Cornbread Recipe (1/4 c. milk, 350°F for 30 min)	½ in. cube
2.5	Egg Jumbos	Stella D'oro/Synder's Lance	½ in. cube
4.2	Graham crackers	Original Graham Crackers/Nabisco	½ in. cube
6.7	Melba toast	Plain, rectangular/Devonsheer, Melba Co.	½ in. sq.
8.0	Ginger snaps	Nabisco	½ in. sq.

D Intensity Scale Values (0–15) for Solid Oral Texture Attributes (Continued)

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
10.0	Rye wafers	Finn Crisp/Vaasan OY	½ in. sq. (2 pcs. stacked)
11.5	Pita chips	Stacy's	½ in. sq. (2 pcs. stacked)
13.0	Peanut brittle	Brand available	½ in. sq. candy part
14.5	Hard candy	Life Savers	1 piece
Technique:	Place sample between molars and bite down evenly until the food crumbles, cracks, or shatters.		
Definition:	The force with which the sample breaks.		
	[Crumbles---------- Fractures]		
8. Standard Viscosity Scale			
1.0	Water	Bottled Mountain Spring (room temp.)	1 tsp
2.0	Light cream	Brand available, not ultrapasteurized (refrigerated)	1 tsp
4.0	Heavy cream	Brand available, not ultrapasteurized (refrigerated)	1 tsp
6.0	Maple syrup	Pure maple syrup, grade A (room temp.)	1 tsp
9.0	Chocolate syrup	Hershey's (room temp.)	1 tsp
12.0	Mixture: 1 cup sweetened condensed milk +2 tbsp heavy cream	Magnolia or Eagle Brand/Eagle Family Foods (refrigerated)	1 tsp
14.5	Sweetened condensed milk	Eagle Brand/Eagle Family Foods (room temp.)	1 tsp
Technique:	(1) Place 1 tsp of product close to lips; draw air in gently to induce flow of liquid; measure the force required.		
	(2) Once product is in mouth, allow to flow across tongue by moving tongue slowly to roof of mouth; measure rate of flow (the force here is gravity).		
Definition:	The rate of flow per unit force:		
	• The force to draw between lips from spoon		
	• The rate of flow across tongue		
	[Not viscous---------- Very viscous]		
9. Standard Denseness Scale			
0.5	Cool Whip	Kraft Foods	2 tbsp
2.5	Marshmallow Fluff	Fluff/Durkee-Mower	2 tbsp
4.0	Nougat center (Remove chocolate first)	Three Musketeers/Mars	½ in. cube
6.0	Malted milk balls	Whopper/The Hershey Company	5 pieces

D Intensity Scale Values (0–15) for Solid Oral Texture Attributes (Continued)

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
			(*Continued*)
9.5	Frankfurter	Cooked 5 min, Oscar Mayer Beef	5, ½ in. slices
15.0	Fruit jellies	Chuckles/Ferrara Candy Co.	3 pieces
Technique:	Place sample between molars and compress.		
Definition:	The compactness of the sample cross section.		
	[Light/airy ---------- Dense/compact]		
10. Standard Crispness Scale			
2.0	Granola bar	Quaker Low Fat Chewy Chunk	1/3 bar
5.0	Club cracker	Keebler	½ cracker
6.5	Graham cracker	Honey Maid/Nabisco	1 in. sq.
7.0	Oat cereal	Cheerios /Toasted Whole Grain	1 oz.
14.0	Corn flakes	Kellogg's	1 oz.
17.0	Melba toast	Devonsheer	½ cracker
Technique:	Place sample between molar teeth and bite down evenly until the food breaks, crumbles, cracks, or shatters.		
Definition:	The force (noise) with which a product breaks or fractures, characterized by many, small breaks.		
	[Not crisp ---------- Very crisp]		
11. Standard Moisture Release/Juiciness Scale			
1.0	Banana	Banana	½ in. slice
2.0	Carrot	Raw carrot	½ in. slice
4.0	Mushroom	Raw mushroom	½ in. slice
7.0	Snap bean	Raw snap bean	5 pieces
8.0	Cucumber	Raw cucumber	½ in. slice
10.0	Apple	Red Delicious apple	½ in. wedge
12.0	Honeydew melon	Honeydew melon	½ in. cubes
15.0	Orange	Florida juice orange	½ in. wedge
15.0	Watermelon	Watermelon	½ in. cube (no seeds)
Technique:	Chew sample with the molar teeth for up to five chews.		
Definition:	The amount of juice/moisture (oil, water) perceived in the mouth.		
	[None ---------- Very juicy]		
12. Standard Flinty/Glassy Scale			
2.0	Bugles corn snacks	General Mills	1 oz.
8.0	Frosted flakes	Kellogg's	1 oz.
14.0	Dehydrated potatoes	Betty Crocker Au Gratin Potatoes	1 oz.
Technique:	Chew sample three times and using the tongue to measure the degree of pointiness of pieces and amount of pointy shards present.		
Definition:	The degree to which the sample breaks into pointy shards and the amount present after three chews.		

D Intensity Scale Values (0–15) for Solid Oral Texture Attributes (Continued)

Scale Value	Reference	Brand/Type/Manufacturer	Sample Size
	[None ---------- Very many pieces]		
13. Standard Moisture Absorption Scale			
0.0	Licorice	Shoestring	1 piece
3.5	Licorice, red	Twizzlers/Hershey's	1 piece
9.0	Popcorn	Bagged/Bachman Air Popped Popcorn	2 tbsp
10.0	Potato chips	Wise	2 tbsp
13.0	Cake	Pound cake, frozen type/Sara Lee	1 slice
15.0	Saltines	Unsalted top premium cracker/Nabisco	1 cracker
Technique:	Chew sample with molars until phase change.		
Definition:	The amount of saliva absorbed by sample during chewdown.		
	[No absorption ---------- High absorption]		
14. Standard Cohesiveness of Mass Scale			
0.0	Licorice	Shoestring	1 piece
2.0	Carrots	Uncooked, fresh, unpeeled	½ in. slice
4.0	Mushroom	Uncooked, fresh	½ in. slice
7.5	Frankfurter	Cooked 5 min/Hebrew National Beef	½ in. slice
10.0	Cheese, yellow	American pasteurized process- deli/ Land O'Lakes	½ in. cube
14.0	Fig Newton	Nabisco	
Technique:	Chew sample with molars until phase change.		
Definition:	The degree to which chewed sample holds together in a mass.		
	[None/no mass ---------- Compact/tight mass]		
15. Standard Toothstick Scale			
2.0	Mushrooms	Uncooked, fresh, unpeeled	½ in. slice
7.5	Graham cracker	Original Graham Crackers/Nabisco	½ in. sq.
10.0	Cheese	Yellow American pasteurized process-deli/Land O'Lakes	½ in. cube
15.0	Candy	Jujyfruits/Ferrara Candy Company	3 pieces
Technique:	Place sample in mouth, chew fully, and swallow or expectorate. Feel tooth surfaces with tongue.		
Definition:	The amount of product adhering to the teeth after mastication of the product.		
	[None ---------- Large Amount]		

E Intensity Scale Values (0–100) for Skinfeel Texture Attributes

Scale Value	Product	Manufacturer
1. Integrity of Shape (Immediate)		
7	Baby oil	Johnson & Johnson
40	Keri Lotion, Original	Novartis
85	Vaseline Intensive Care	Unilever
92	Neutrogena Norwegian Hand Cream	Johnson & Johnson
2. Integrity of Shape (After 10 sec)		
3	Baby oil	Johnson & Johnson
30	Keri Lotion, Original	Novartis
80	Vaseline Intensive Care	Unilever
92	Neutrogena Norwegian Hand Cream	Johnson & Johnson
3. Gloss		
5	Gillette Foamy Reg. Shave Cream	Procter & Gamble
36	Noxzema	Unilever
70	Neutrogena Norwegian Hand Cream	Johnson & Johnson
78	Vaseline Intensive Care	Unilever
98	Baby oil	Johnson & Johnson
4. Firmness		
0	Baby oil	Johnson & Johnson
30	Olay Active Hydrating Beauty Fluid Lotion	Procter & Gamble
55	Ponds Cold Cream, Original	Unilever
84	Petrolatum	Generic
98	Lanolin HPA	Lansinoh
5. Stickiness		
1	Baby oil	Johnson & Johnson
26	Vaseline Intensive Care	Unilever
84	Petrolatum	Generic
99	Lanolin HPA	Lansinoh
6. Cohesiveness		
0	Baby oil	Johnson & Johnson
10	Vaseline Intensive Care	Unilever
60	Dove Cream Oil Intensive Body Lotion	Unilever
82	Petrolatum	Generic
7. Peaking		
0	Baby oil	Johnson & Johnson
23	Keri Lotion, Original	Novartis
36	Vaseline Intensive Care	Unilever
77	Zinc oxide	Generic
96	Petrolatum	Generic

E Intensity Scale Values (0–100) for Skinfeel Texture Attributes

Scale Value	Product	Manufacturer
8. Wetness		
0	Talc powder	Johnson & Johnson
22	Petrolatum	Generic
35	Baby oil	Johnson & Johnson
60	Vaseline Intensive Care	Unilever
70	Aloe Vera gel	Fruit of the Earth
100	Water	—
9. Spreadability		
29	Petrolatum	Generic
66	Vaseline Intensive Care	Unilever
97	Baby oil	Johnson & Johnson
10. Thickness		
5	Isopropyl alcohol	Generic
30	Vaseline Intensive Care	Unilever
65	Petrolatum	Generic
86	Neutrogena Norwegian Hand Cream	Johnson & Johnson
11. Amount of Residue		
0	Untreated skin	—
15	Vaseline Intensive Care	Unilever
65	Petrolatum	Generic
85	Baby Oil	Johnson & Johnson

F Intensity Scale Values (0–15) for Fabric-Feel Attributes

Scale Value	Fabric Type	Testfabrics ID#[a]
1. Stiffness		
1.3	Polyester/cotton 50/50 single knit tubular	7421
4.7	Mercerized cotton print cloth	400M
8.5	Mercerized combed cotton poplin	407
14.0	Cotton organdy	447
2. Force to Gather		
1.5	Polyester cotton 50/50 single knit tubular	7421
3.5	Cotton cloth greige	400R
7.0	Bleached cotton terry cloth	420BR
14.5	#10 Cotton duck greige	426
3. Force to Compress		
1.5	Polyester/cotton 50/50 single knit tubular	7421
3.4	Cotton cloth greige	400R

F Intensity Scale Values (0–15) for Fabric-Feel Attributes (Continued)

Scale Value	Fabric Type	Testfabrics ID#[a]
		(Continued)
8.0	Bleached cotton terry cloth	420BR
14.5	#10 Cotton duck greige	426
4. Depression Depth		
0.7	Cotton print cloth	400
1.8	Desized, bleached cotton duck	464
6.4	Texturized polyester interlock knit fabric	730
13.6	Bleached cotton terry cloth	420BR
5. Springiness		
0.7	Cotton print cloth	400
1.8	Desized, bleached cotton duck	464
6.2	Texturized polyester interlock knit fabric	730
10.5	Bleached cotton terry cloth	420BR
13.5	Texturized polyester double knit jersey	720
6. Fullness/Body		
1.6	Combed cotton batiste	435
4.0	Cotton sheeting	493
7.8	Cotton single knit	473
13.3	Cotton fleece	484
7. Tensile Stretch		
0.5	#8 Cotton duck greige	474
2.6	Spun viscose challis	266W
13.0	Texturized polyester double knit jersey	720
15.0	Texturized polyester interlock knit fabric	730
8. Compression Resilience: Intensity		
0.9	Polyester/cotton 50/50 single knit fabric	7421
3.8	Cotton cloth greige	400R
9.5	Acetate satin bright ward, delustered filling	105B
14.0	#10 Cotton duck greige	426
9. Compression Resilience: Rate		
1.0	Polyester/cotton 50/50 single knit tubular	7421
7.0	Filament nylon 6.6 semidull taffeta	306A
14.0	Dacron	738
10. Thickness		
1.3	Filament nylon 6.6 semidull taffeta	306A
3.3	Cotton print cloth	400
7.7	Cotton sheeting	493
13.0	#10 Cotton duck greige	426

F Intensity Scale Values (0–15) for Fabric-Feel Attributes (Continued)

Scale Value	Fabric Type	Testfabrics ID#[a]
11. Fabric-to-Fabric Friction		
1.7	Filament nylon 6.6 semidull taffeta	306A
5.0	Dacron	738
10.0	Acetate satin bright ward, delustered filling	105B
15.0	Cotton fleece	484
12. Fuzzy		
0.7	Dacron	738
3.6	Cotton crinkle gauze	472
7.0	Cotton T-shirt, tubular	437W
13.6	Cotton fleece	484
13. Hand Friction		
1.4	Filament nylon 6.6 semidull taffeta	306A
3.5	Bleached, mercerized combed broadcloth	419
7.2	Cotton print cloth	400
10.0	Cotton flannel	425
15.0	Bleached cotton terry cloth	420BR
14. Noise intensity		
1.6	Cotton flannel	425
2.7	Cotton crinkle gauze	472
6.3	Cotton organdy	447
14.5	Dacron 56 taffeta	738
15. Noise Pitch		
1.5	Cotton flannel	425
2.5	Cotton crinkle gauze	472
7.2	Cotton organdy	447
14.5	Dacron 56 taffeta	738
16. Gritty		
0.5	Polyester/cotton 50/50 single knit tubular	7421
6.0	Cotton cloth, greige	400R
10.0	Cotton print cloth	400
11.5	Cotton organdy	447
17. Grainy		
2.1	Mercerized combed cotton poplin	407
4.9	Carded cotton sateen bleached	428
9.5	Cotton tablecloth fabric	455-54
13.6	#8 Cotton duck greige	474

[a] Testfabrics identification numbers are the product numbers of Testfabrics Inc., P.O. Box 26, West Pittston, PA 18643, www.testfabrics.com

APPENDIX 12.3 STREAMLINED APPROACH TO SPECTRUM REFERENCES

Central to the Spectrum method is the use of intensity references. During training, Spectrum panelists are typically oriented to dozens of intensity references for flavor and texture. However, time or budget constraints often lead companies to seek ways to reduce the volume of references used, or panel leaders desire a smaller set of references for daily panel use. Also, many panels are more comfortable using references within product categories they typically evaluate. To address this, Sensory Spectrum has developed a streamlined approach to Spectrum references using a dozen foods commonly available in the United States. These 12 products can serve as the building blocks for flavor and texture intensity references and provide a panel leader with readily available reference products requiring minimal preparation. Since the Spectrum method does not depend on the availability of a single reference product, references that best meet the needs of the panel should be selected. The list below is intended to represent the average attribute intensity values for those products. Slight product variability and individual differences in panelist sensitivity (ex. bitterness) are expected. A panel leader might select 3–7 products to use regularly, providing panelists with the in-context references they tend to crave. In addition, Sensory Spectrum advocates the selection of panel specific internal control products for which complete profiles are developed then presented and reviewed at each panel session as a tool to standardize the panel's scores and minimize intensity drift. This approach is commonly used in Spectrum skinfeel panels.

1. Pepperidge Farm Bordeaux Cookies

AROMATICS	
Total impact	7.0
Grain complex	3.0
Toasted grain	3.0
Dairy complex	1.5
Butter/milk fat	1.5
Sweet aromatics	5.0
Vanilla/vanillin	1.0
Caramelized	4.5
Basic Tastes	
Sweet	12.5
Salt	4.0
TEXTURE	
Surface	
Microroughness	10.0
Macroroughness	3.0
Loose particles	5.0
Oily lips	2.0
Chewdown	
Hardness	8.0

[Smooth ---------- Rough]
Graininess is caused by small surface particles:
[Smooth ---------- Grainy]
Bumpiness is caused by large particles:
[Smooth ---------- Bumpy]

c. Particle interaction — The amount of stickiness among particles or the amount of agglomerations of small particles.

(Stickiness): [Not sticky ---------- Sticky]

(Clumpiness): [Loose particles ---------- Clumps]

3. Size/Shape

a. Size — The relative size of the pieces or particles in the sample:
[Small ---------- Large]
[Thin ---------- Thick]

b. Shape — Description of the predominant shape of particles: flat, round, spherical, square, and so on.
[No scale]

4. Surface Shine

Amount of light reflected from the product's surface:
[Dull ---------- Shiny]

B. Terms Used to Describe Flavor (General and Baked Goods)

The full list of fragrance and flavor descriptors is too unwieldy to reproduce here; the list of aromatics alone contains over a thousand words. In the following, aromatics for baked goods are shown as an example.

Flavor is the combined effects of the

- Aromatics
- Tastes
- Chemical feelings

stimulated by a substance in the mouth. For baked goods, it is convenient to subdivide the aromatics into

- Grainy aromatics
- Grain-related terms
- Dairy terms
- Other processing characteristics
- Sweet aromatics
- Added flavors/aromatics
- Aromatics from shortening
- Other aromatics

Example: Flavor Terminology of Baked Goods

1. Aromatics (of Baked Goods)

a. Grainy aromatics

Those aromatics or volatiles that are derived from various grains; the term *cereal* can be used as an alternative, but it implies finished and/or toasted character and is, therefore, less useful than *grainy.*

Grainy: the general term to describe the aromatics of grains that cannot be tied to a specific grain by name.

Terms pertaining to a specific grain: corn, wheat, oat, rice, soy, rye.

Grain character modified or characterized by a processing note, or lack thereof:

Raw corn	Cooked corn	Toasted corn
Raw wheat	Cooked wheat	Toasted wheat
Raw oat	Cooked oat	Toasted oat
Raw rice	Cooked rice	Toasted rice
Raw soy	Cooked soy	Toasted soy
Raw rye	Cooked rye	Toasted rye

Definitions of processed grain terms:

Raw (name) flour: the aromatics perceived in a particular grain that has not been heat treated.

Cooked (name) flour: the aromatics of a grain that has been gently heated or boiled; Cream of Wheat has cooked wheat flavor; oatmeal has cooked oat flavor.

Baked/toasted (name) flour: the aromatics of a grain that has been sufficiently heated to caramelize some of the starches and sugars.

b. Grain-related terms

Green: the aromatic associated with unprocessed vegetation, such as fruits and grains; this term is related to raw, but has the additional character of hexenals, leaves, and grass.

Hay-like/grassy: grainy aromatic with some green character of freshly mowed grass, air-dried grain, or vegetation.

Malty: the aromatics of toasted malt.

c. Dairy terms

Those volatiles related to milk, butter, cheese, and other cultured dairy products. This group includes the following terms:

Dairy: as above.

Milky: more specific than dairy, the flavor of regular or cooked cow's milk.

Buttery: the flavor of high-fat fresh cream or fresh butter; not rancid, butyric, or diacetyl-like.

Cheesy: the flavor of milk products treated with rennet, which hydrolyzes the fat, giving it a butyric or isovaleric acid character.

d. Other processing	Caramelized: a general term used to describe starches characteristics and sugars characteristics that have been browned; used alone when the starch or sugar (e.g., toasted corn) cannot be named. Burnt: related to overheating, overtoasting, or scorching the starches or sugars in a product.
e. Added flavors/ aromatics	The following terms relate to specific ingredients that may be added aromatics to baked goods to impart specific character notes; in each case, references for the term are needed: Nutty: peanut, almond, pecan, and so on. Chocolate: milk chocolate, cocoa, chocolate-like. Spices: cinnamon, clove, nutmeg, and so on. Yeasty: natural yeast (not chemical leavening).
f. Aromatics from shortening	The aromatics associated with oil or fat-based shortening agents used as shortening in baked goods: Buttery: see dairy. Oil flavor: the aromatics associated with vegetable oils, not to be confused with an oily film on the mouth surfaces, which is a texture characteristic. Lard flavor: the aromatics associated with rendered pork fat. Tallowy: the aromatics associated with rendered beef fat.
g. Other aromatics	The aromatics that are not usually part of the normal product profile and/or do not result from the normal ingredients or processing of the product: Vitamin: aromatics resulting from the addition of vitamins to the product. Cardboard flavor: aromatics associated with the odor of cardboard box packaging, which could be contributed by the packaging or by other sources, such as staling flours. Rancid: aromatics associated with oxidized oils, often also described as painty or fishy. Mercaptan: aromatics associated with the mercaptan class of sulfur compounds. Other terms that panelists may use to describe odors arising from sulfur compounds are skunky, sulfitic, rubbery.

(End of section referring to baked goods only.)

2. Basic Tastes

a. Sweet	The taste stimulated by sucrose and other sugars, such as fructose, glucose, and so on, and by other sweet substances such as Rebaudioside A, saccharin, aspartame, and Acesulfam K.
b. Sour	The taste stimulated by acids, such as citric, malic, phosphoric, and so on.

c. Salty	The taste stimulated by sodium salts, such as sodium chloride and sodium glutamate, and in part by other salts, such as potassium chloride.
d. Bitter	The taste stimulated by substances such as quinine, caffeine, and hop bitters.

3. Chemical Feeling Factors

Those characteristics that are the response of tactile nerves to chemical stimuli.

a. Astringency	The shrinking or puckering of the tongue surface caused by substances such as tannins or alum.
b. Heat	The burning sensation in the mouth caused by certain substances such as capsaicin from red or piperine from black peppers; mild heat or warmth is caused by some brown spices.
c. Cooling	The cool sensation in the mouth or nose produced by substances such as menthol and mints.

C. Terms Used to Describe Semisolid Oral Texture

These terms are those specifically added for semisolid texture. Solid oral texture terms also may be used when applicable to any product or sample. Each set of texture terms includes the procedure for manipulation of the sample.

1. First Compression

Place 1/2 tsp. of sample on tongue; compress between tongue and palate.

a. Slipperiness	Ease to slide tongue over product: [Drag----------Slip]
b. Firmness	The force required to compress between tongue and palate: [Soft ----------Firm]
c. Cohesiveness	The amount the sample deforms/strings rather than shears/cuts: [Shears/short----------Deforms/cohesive]
d. Denseness	Compactness of the cross section: [Airy ----------Dense/compact]

2. Manipulation

Compress sample several more times (3–8 times).

a. Particle amount	The relative number/amount of particles in the mouth: [None ----------Many]
b. Particle size	The size of the particle in the mass: [Small ----------Large]

3. After Feel

Swallow or expectorate.

a. Mouthcoating — The amount of film left on the mouth surfaces:
[None ----------High]

Example: Semisolid Texture Terminology—Oral Texture of Peanut Butter

1. Surface — Hold 1/2 tsp. on spoon; feel surface with lips.
Moistness—amount of wetness or oiliness (or both) on surface:
[Dry ---------- Oily/moist]
Stickiness—amount of product adhering to lips:
[None ----------Very Sticky]
Roughness—overall amount of small and large particles in the surface:
[Smooth ---------- Rough]

2. First compression — Place 1/2 tsp. of peanut butter in mouth and compress between tongue and palate.
Semisolid slipperiness—ease to slide tongue over product:
[Drag----------Slip]
Semisolid firmness—force to compress sample:
[Soft ----------Firm]
Semisolid cohesiveness—amount sample deforms/strings rather than shears/cuts:
[Shears/short----------Deforms/cohesive]
Adhesiveness (palate)—amount of force to remove sample from roof of mouth using tongue:
[No force ---------- High force]
Stickiness—amount of product that adheres to oral surfaces:
[Not sticky----------Very sticky]

3. Breakdown/ manipulation — Manipulate between tongue and palate until phase change. Evaluate for:

Moisture absorption—amount of saliva absorbed by the sample:
[No Absorption----------High Absorption]
Semisolid cohesiveness of mass—
Amount of sample that deforms rather than crumbles, cracks, or breaks:
[Crumbles----------Deforms]

Stickiness of mass—amount of mass that adheres to oral surfaces:
[None ----------Very sticky]

4. Residual — Feel mouth surface and teeth with tongue after product is swallowed or expectorated. Evaluate for:
Mouthcoating—amount of film (total) left on mouth surface:
[None ---------- High]
Oily film—amount of oily residue on oral surface:
[None ---------- High]
Toothstick—amount of product adhering to the teeth:
[None ---------- High]

D. Terms Used to Describe Solid Oral Texture

Each set of texture terms includes the procedure for manipulation of the sample.

1. Surface Texture

Feel surface of sample with lips.

a. Surface roughness — The overall roughness of the surface of the sample:
[Smooth ---------- Rough]
Macroroughness—the degree of roughness attributed to bumps/lumps in surface:
[Smooth ---------- Rough]
Microroughness—the degree of roughness attributed to small particles in surface:
[Smooth ---------- Rough]

b. Loose particles — Amount of loose particles free of the surface:
[None ---------- Many]

c. Surface moisture — The amount of wetness or oiliness (or both) on surface:
[None ---------- High (wet/oily/moist)]

2. Partial Compression

Compress partially (specify with tongue, incisors, or molars) without breaking, and release.

a. Springiness (rubberiness) — Degree to which sample returns to original shape after a certain time period:
[No recovery ---------- Very springy]

3. First Bite (with Incisors)/First Chew (with Molars)

Bite through a predetermined size sample with incisors or molars as appropriate.

a. Hardness — Force required to compress through the product:
[Low force ("soft") ---------- High force ("hard")]

b. Cohesiveness — Amount of sample that deforms rather than crumbles, cracks, or breaks:
[Crumbles ---------- Deforms]

c. Fracturability	The force with which the sample breaks: [Crumbles----------Fractures]
d. Uniformity of bite	Evenness of force throughout bite: [Not uniform force ---------- Uniform force]
e. Moisture release/ juiciness	Amount of wetness/juiciness (oil, water) perceived in the mouth: [None ---------- Very juicy]
f. Amount of particles	Amount of particles resulting from bite or detected in center of sample: [None ---------- Many]
g. Denseness	Compactness of cross section: [Airy ---------- Dense]
h. Crispness	The force (noise) with which the sample breaks or fractures, characterized by many, small breaks: [Not crisp ---------- Very crisp]
i. Crunchiness	The force (noise) with which the sample breaks or fractures, characterized by few, large breaks: [Not crunchy---------- Very crunchy]

4. Chewdown

Chew sample with molars until phase change (to bolus):

a. Moisture absorption	Amount of saliva absorbed by product: [No absorption ----------High absorption]
b. Cohesiveness of mass	Degree to which sample holds together in a mass: [None ---------- Tight mass]
Moistness of mass	The amount of wetness/oiliness (or both) on the surface of the mass at phase change: [Dry ----------Wet/Oily/Moist]
Roughness of mass	The amount of roughness on the surface of the mass (can further characterize as gritty, grainy, coarse, lumpy, etc.): [None ----------High]
c. Adhesiveness to palate	Amount of force to remove sample from roof of mouth using tongue: [No force ---------- High force]
d. Flinty/glassy	The amount of sharp abrasive pieces in the mass: [None ----------Very many pieces]
e. Toothstick	Amount of product adhering to the teeth: [None ---------- Strong Adhesion]
f. Rate of melt	The rate of which the product melts during chew and manipulation: [Slow ---------- Fast]

5. Residual

Swallow or expectorate sample.

a. Loose particles	Amount of particles left in mouth: [None ---------- Many]
b. Oily film	Amount and degree of oil felt by the tongue when moved over the surfaces of the mouth: [None ---------- High]
c. Sticky mouthcoating	Stickiness/tackiness of coating when tapping tongue on roof of mouth: [Not sticky ---------- Very sticky]
d. Toothpack	Amount of product left in the crevices of teeth: [None ---------- Highly packed]

Example: Solid Texture Terminology of Oral Texture of Cookies

1. Surface	Place cookie on surface of lips and evaluate for: Roughness—overall amount of small and large particles in the surface: [Smooth ---------- Rough] Loose particles—amount of loose particles on surface: [None ---------- Many] Surface moisture—amount of wetness or oiliness (or both) on surface: [None ---------- High (wet/oily/moist)]
2. First bite	Place one third of cookie between incisors, bite down, and evaluate for: Fracturability—force with which the sample breaks: [Crumbly ---------- Fractures] Hardness—force required to compress through sample: [Soft ---------- Hard] Particle size—size of crumb pieces: [Small ---------- Large]
3. First chew	Place one third of cookie between molars, bite through, and evaluate for: Denseness—compactness of cross section: [Airy ---------- Dense] Uniformity of chew—evenness of force throughout chew: [Uneven ---------- Even]
4. Chewdown	Place one third of cookie between molars, chew to bolus, and evaluate for Moisture absorption—amount of saliva absorbed by the sample: [No absorption ---------- High absorption]

Cohesiveness of mass—degree to which mass holds together:
[No mass ---------- Tight mass]
Toothpack—amount of sample left in the crevices of teeth:
[None ---------- Highly packed]
Grittiness between teeth—amount of small, hard particles between teeth during chew:
[None ---------- High]

5. Residual — Swallow sample and evaluate residue in mouth:
Oily—amount of oily residue on oral surface:
[None ---------- High]
Particles—amount of particles left in mouth:
[None ---------- Many]
Chalky—degree to which mouth feels chalky:
[Not chalky ---------- Very chalky]

E. Terms Used to Describe Skinfeel of Lotions and Creams

1. Appearance

In a petri dish, dispense the product in a spiral shape. Using a nickel-size circle, fill from edge to center.

a. Integrity of shape — Degree to which product holds its shape:
[Flattens ---------- Retains shape]

b. Integrity of shape — Degree to which product holds its shape after 10 s
[Flattens ---------- Retains shape]
Tap finger together lightly three times.

c. Gloss — The amount of reflected light from product:
[Dull/flat ---------- Shiny/glossy]

2. Pick Up

Using automatic pipette, deliver 0.1 cc of product to tip of thumb or index finger. Compress product slowly between finger and thumb one time.

a. Firmness — Force required to fully compress product between thumb and index finger:
[No force ---------- High force]

b. Stickiness — Force required to separate fingertips:
[Not sticky ---------- Very sticky]

c. Cohesiveness — Amount sample strings rather than breaks when fingers are separated:
[No strings ---------- High strings]

d. Amount of peaking — Degree to which product makes stiff peaks on fingertips:
[No peaks/flat ---------- Stiff peaks]

3. Rub Out

Using automatic pipette, deliver 0.05 cc of product to center of 2 in. circle on inner forearm. Gently spread product within the circle using index or middle finger, at a rate of two strokes per second.

After 3 rubs,

a. Wetness	Amount of water perceived while rubbing: [None ---------- High amount]
b. Spreadability	Ease of moving product over the skin: [Difficult/drag ---------- Easy/slip]

After 12 rubs,

c. Thickness	Amount of product felt between fingertip and skin: [Thin, almost no product ---------- Thick, lots of product]

After 15–20 rubs,

d. Oil	Amount of oil perceived in the product during rub out: [None ---------- Extreme]
e. Wax	Amount of wax perceived in the product during rub out: [None ---------- Extreme]
f. Grease	Amount of grease perceived in the product during rub out: [None ---------- Extreme]

Continue rubbing and evaluate for:

g. Absorbency	The number of rubs at which the product loses wet, moist feel and a resistance to continue is perceived (upper limit = 120 rubs).

4. Afterfeel (Immediate)

a. Gloss	Amount or degree of light reflected off skin: [Dull ---------- Shiny]
b. Sticky	Degree to which fingers adhere to product: [Not sticky ---------- Very sticky]
c. Slipperiness	Ease of moving fingers across skin: [Difficult/drag ---------- Easy/slip]
d. Amount of residue	Amount of product on skin: [None ---------- Large amount]
e. Type of residue	Oily, waxy, greasy, silicone, powdery, chalky.

F. Terms Used to Describe Handfeel of Fabric or Paper

1. Force to gather	The amount of force required to collect/gather the sample toward the palm of the hand: [Low force ---------- High force]
2. Force to compress	The amount of force required to compress the gathered sample into the palm: [Low force ----------High force]
3. Stiffness	The degree to which the sample feels pointed, ridged, and cracked; not pliable, round, curved: [Pliable/round ---------- Stiff]
4. Fullness	The amount of material/paper/fabric/sample felt in the hand during manipulation: [Low amount of sample/flimsy -- High amount of sample/body]
5. Compression resilience	The force with which the sample presses against cupped hands: [Creased/folded ---------- Original shape]
6. Depression depth	The amount that the sample depresses when downward force is applied: [No depression ---------- Full depression]
7. Depression resilience/ springiness	The rate at which the sample returns to its original position after resilience/depression is removed: [Slow ----------Fast/springy]
8. Tensile stretch	The degree to which the sample stretches from its original shape: [No stretch---------- High stretch]
9. Tensile extension	The degree to which the sample returns to original shape after tensile force is removed (Note: This is a visual evaluation): [No return ----------Fully returned]
10. Hand friction	The force required to move the hand across the surface: [Slip/no drag ----------Drag]
11. Fabric friction	The force required to move the fabric over itself: [Slip/no drag ---------- Drag]
12. Roughness	The overall presence of gritty, grainy, or lumpy particles in the surface; lack of smoothness: [Smooth ---------- Rough]
13. Gritty	The amount of small, abrasive picky particles in the surface of the sample: [Smooth/not gritty ----------Gritty]
14. Lumpy	The amount of bumps, embossing, large fiber bundles in the sample: [Smooth/not lumpy ----------Lumpy]

15. Grainy	The amount of small, rounded particles in the sample: [Smooth/not grainy ---------- Grainy]
16. Fuzziness	The amount of pile, fiber, fuzz on the surface: [Bald---------- Fuzzy/nappy]
17. Thickness	The perceived distance between thumb and fingers: [Thin ---------- Thick]
18. Moistness	The amount of moistness on the surface and in the interior of the paper/fabric. Specify if the sample is oily versus wet (water) if such a difference is detectable: [Dry ---------- Wet]
19. Warmth	The difference in thermal character between paper/fabric and hand: [Cool ---------- Warm]
20. Noise intensity	The loudness of the noise: [Soft ---------- Loud]
21. Noise pitch	Sound frequency of the noise: [Low/bass ---------- High/treble]

G. Terms Used to Describe the Feel of Hair (Wet and Dry)

Wet Hair Evaluation Procedure

1. Preparation before Application

Measure length of hair swatch from the end of the card to the end of the hair. Record the measurement. Pull hair swatch taut and measure as above. Record measurement.

Evaluate for

a. Sheen	Amount of reflected light: [Dull---------- Shiny]

Comb through swatch with rattail comb. At third stroke of combing, evaluate for:

b. Combability (top half of swatch) (dry)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ---------- Easy]
c. Combability (bottom half of swatch) (dry)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ---------- Easy]

d. "Fly away" hair	The tendency of the individual hairs to repel each other during combing after three strokes of combing down hair shafts: [None ---------- Much]

2. Application of Lotion

Dip hair swatch into cup of room temperature (72 °F) tap water. Thoroughly wet hair swatch. Squeeze out excess water. Pipet 0.125 cc of hair lotion onto edge of palm of hand. Using opposite index and middle fingers, rub onto edge of palm two to three times to distribute lotion. Pick up hair swatch by the card. Using long, even strokes from the top to bottom, apply lotion to hair swatch, turning card after each stroke and rubbing ends of swatch with index and middle fingers. Evaluate for:

a. Ease of distribution	Ease of rubbing product over hair: [Difficult ----------Easy]
b. Amount of residue	The amount of residue left on the surface of the hands: (Untreated skin = 0) [None ----------Extreme]
c. Type of residue	Oily, waxy, greasy, silicone

3. Evaluation

Clean hands with water before proceeding. Comb through hair swatch with a rattail comb one time and evaluate for:

a. Ease of detangling	Ease to comb through hair: [Very tangled, hard to comb-----Not tangled, easy to comb]

At the third stroke of combing evaluate for:

b. Combability (top half of swatch) (wet)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ---------- Easy]
c. Combability (bottom half of swatch) (wet)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ----------Easy]
d. Stringiness (visual)	The sticking of individual hairs together in clumps: [Unclumped---------- Clumped]
e. Wetness (tactile)	The amount of perceived moisture: [Dry ---------- Wet]
f. Coldness (tactile)	Thermal sensation of lack of heat: [Hot---------- Cold]

g. Slipperiness (tactile)	Lack of drag or resistance as moving hairs along between fingers: [Drags---------- Slips]
h. Roughness (tactile)	A rough, brittle texture of hair shafts: [Smooth ----------Rough]
i. Coatedness (tactile)	The amount of residue left on the hair shaft: [None, uncoated---------- Very coated]
j. Stickiness of hair to skin (tactile)	The tendency of the hair to stick to the fingers: [Not sticky---------- Very sticky]

4. Evaluation after Drying

Let hair swatch dry for 30 min lying on clean paper towels, checking swatch at 5 min intervals, and evaluating earlier if dried. At the third stroke of combing evaluate for:

a. Combability (top half of swatch) (dry)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ---------- Easy]
b. Combability (bottom half of swatch) (dry)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ----------Easy]
c. "Fly away" hair	The tendency of the individual hairs to repel each other during combing after three strokes of combing down hair shafts: [None ----------Much]
d. Stringiness (visual)	The sticking of individual hairs together in clumps: [Unclumped---------- Clumped]
e. Sheen	Amount of reflected light: [Dull---------- Shiny]
f. Roughness (tactile)	A rough, brittle texture of hair shafts: [Smooth ----------Rough]
g. Coatedness (tactile)	The amount of residue left on the hair shaft: [None, uncoated---------- Very coated]

Dry Hair Evaluation Procedure

1. Preparation before Application

Measure length of hair swatch from the end of the card to the end of the hair. Record the measurement. Pull hair swatch taut and measure as above. Record measurement. Visually evaluate hair for

a. Sheen	Amount of reflected light: [Dull----------Shiny]

Comb through hair with rattail comb. At third stroke of combing, evaluate for:

b. Combability (top half of swatch) (dry)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ----------Easy]
c. Combability (bottom half of swatch) (dry)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ---------- Easy]
d. "Fly away" hair	The tendency of the individual hairs to repel each other during combing after three strokes of combing down hair shafts: [None ----------Much]

2. Application of Lotion

Pipet 0.125 cc of hair lotion onto edge of palm of hand. Using opposite index and middle fingers, rub onto edge of palm two to three times to distribute lotion. Pick up hair swatch by the card. Using long, even strokes, from the top to bottom, apply lotion to hair swatch, turning card after each stroke, rubbing ends of swatch with index and middle fingers. Evaluate for:

a. Ease of distribution	Ease of rubbing product over hair: [Difficult ---------- Easy]
b. Amount of residue	The amount of residue left on the surface of the hands: (Untreated skin = 0) [None ----------Extreme]
c. Type of residue	Oily, waxy, greasy, silicone

3. Evaluation

Clean hands with water before proceeding. Comb through hair swatch with a rattail comb. At the third stroke of combing evaluate for:

a. Combability (top half of swatch) (wet)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ----------Easy]

b. Combability (bottom half of swatch) (wet)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ----------Easy]
c. Stringiness (visual)	The sticking of individual hairs together in clumps: [Unclumped----------Clumped]
d. Wetness (tactile)	The amount of perceived moisture: [Dry ----------Wet]
e. Coldness (tactile)	Thermal sensation of lack of heat: [Hot----------Cold]
f. Slipperiness (tactile)	Lack of drag or resistance as moving hairs along between fingers: [Drags----------Slips]
g. Roughness (tactile)	A rough, brittle texture of hair shafts: [Smooth ---------- Rough]
h. Coatedness (tactile)	The amount of residue left on the hair shaft: [None, uncoated----------Very coated]
i. Stickiness of hair to skin (tactile)	The tendency of the hair to stick to the fingers: [Not sticky---------- Very sticky]

4. Evaluation after Drying

Let hair swatch dry for 30 min lying on clean paper towels, checking swatch at 5 min intervals and evaluating earlier if dried. Record drying time. Measure and record length of hair swatch from the end of the card to the end of the hair. Pull hair swatch taut and measure as above. Record measurement. Comb through hair swatch with rattail comb. At the third stroke of combing evaluate for:

a. Combability (dry) (top half of swatch)	Ease with which comb can be moved down hair shafts without resistance or hair tangling: [Difficult ----------Easy]
b. Combability (dry)	Ease with which comb can be moved down hair shafts without bottom half of swatch resistance or hair tangling: [Difficult ----------Easy]
c. "Fly away" hair	The tendency of the individual hairs to repel each other during combing after three strokes of combing down hair shafts: [None ----------Much]

d. Stringiness (visual)	The sticking of individual hairs together in clumps: [Unclumped----------Clumped]
e. Sheen	Amount of reflected light: [Dull----------Shiny]
f. Roughness (tactile)	A rough, brittle texture of hair shafts: [Smooth ---------- Rough]
g. Coatedness (tactile)	The amount of residue left on the hair shaft: [None, uncoated----------Very coated]

H. Terms Used to Describe the Lather and Skinfeel of Bar Soap

Full Arm Test

1. Preparation for Skinfeel Test

Instruct panelists to refrain from using any type of moisturizing cleanser on evaluation days (to include bar soap, cleansing cream, bodywash, and cleansing oil) and from applying lotions, creams, or other moisturizers to their arms. Panelists may rinse arms with water and pat dry.

Limit panelists to evaluation of no more than two samples per day (one sample per site, beginning with the left arm). For the second soap sample, repeat the washing procedure on the right arm evaluation site. Wash each site once only.

2. Baseline Evaluation of Site

Visually evaluate skin for

a. Gloss	The amount or degree of light reflected off skin: [Dull----------Shiny]
b. Visual dryness	The degree to which the skin looks dry (ashy/flaky): [None ----------Very dry]

Stroke cleansed fingers lightly across skin and evaluate for

c. Slipperiness	Ease of moving fingers across the skin: [Drag---------- Slip]
d. Amount of residue	The amount of residue left on the surface of the skin: [None ----------Extreme]
e. Type of residue	Indicate the type of residue: Soap film, oily, waxy, greasy, powder
f. Dryness/ roughness	The degree to which the skin feels rough: [Smooth ---------- Rough]
g. Moistness	The degree to which the skin feels moist: [Dry ---------- Moist]

h. Tautness — The degree to which the skin feels taut or tight:
[Loose/pliable ----------Very tight]

Using edge of fingernail, scratch a line through the test site. Visually evaluate for:

i. Whiteness — The degree to which the scratch appears white:
[None ---------- Very white]

3. Evaluation of Lather and Skinfeel

Application and washing procedure: Apply wet soap bar to wet evaluation site. Apply with up–down motion (1 up–down lap = ½ s).

a. Amount of lather observed during application:
At 10, 20, 30 laps — [None ---------- Extreme]

At 30 laps continue with

b. Thickness of lather — Amount of product felt between fingertips and skin:
[Thin ---------- Thick]

c. Bubble size variation — The variation seen within the bubble size (visual):
[Homogeneous ---------- Heterogeneous]

d. Bubble size — The size of the soap bubbles in the lather (visual):
[Small ---------- Large]

Rinsing procedure: Rinse site by placing arm directly under warm running water. Use free hand to stroke gently with up–down lap over the site. Rinse for 15 laps. (1 lap = 1 s). Also rinse evaluation fingers.

Evaluation before Drying

a. Rinsability — The degree to which the sample rinses off (visual):
[None ---------- All]

Gently stroke upward on skin site with a clean finger and evaluate for:

b. Slipperiness — Ease of moving fingers across the skin:
[Drag----------Slip]

c. Amount of residue — The amount of residue left on the surface of the skin:
[None ----------Extreme]

d. Type of residue — Indicate the type of residue:
soap film, oily, waxy, greasy, powder

Evaluation after drying: Dry the site by covering it with a paper towel and patting dry 3 times along the site. Also thoroughly dry evaluation finger. Visually evaluate skin for

a. Gloss	Visual: amount of light reflected on the surface of the skin: [Dull----------Shiny/glossy]
b. Visual dryness	The degree to which the skin looks dry (ashy/flaky): [None ---------- Very dry]

Tap dry, cleansed finger over treated skin. Gently stroke skin site with clean finger and evaluate for:

c. Stickiness	The degree to which fingers stick to residual product on the skin: [Not sticky----------Very sticky]
d. Slipperiness	Ease of moving fingers across the skin: [Drag----------Slip]
e. Amount of residue	The amount of residue left on the surface of the skin: [None ---------- Extreme]
f. Type of residue	Indicate the type of residue: Soap film, oily, waxy, greasy, powder.
g. Dryness/ roughness	The degree to which the skin feels dry/rough: [Smooth ---------- Dry/rough]
h. Moistness	The degree to which the skin feels moist, wet: [Dry ---------- Moist]
i. Tautness	The degree to which the skin feels taut or tight: [Loose/pliable ---------- Very taut]

Using the edge of the fingernail, scratch through test site and evaluate for:

j. Whiteness	The degree to which the scratch appears white: [None ---------- Very white]

I. Terms Used to Describe the Skinfeel of Antiperspirants

Roll-On/Solids/Gels

1. Preparation of Skin

Evaluation site (crook of arm) is washed with nonabrasive, nondeodorant soap more than 10 min prior to the start of the evaluation. No lotion is applied to arms before the evaluation. Panelists should wear short-sleeved or sleeveless shirts to panel to avoid rubbing any product off onto clothing during evaluation.

A 6 in. × 2 in. rectangle is marked on the crook of the arm so the fold bisects the rectangle. Divide the rectangle into four 1.5 in. sections to allow for undisturbed area for each timed evaluation point.

2. Baseline Evaluation

Prior to application, instruct panelists to evaluate untreated sites for baseline references. Visually evaluate skin for

a. Gloss	The amount or degree of light reflected off skin: [Dull---------- Shiny]
b. Visual dryness	The degree to which the skin looks dry (ashy/flaky): [None ----------Very dry]

Stroke cleansed fingers lightly across skin and evaluate for:

c. Slipperiness	Ease of moving fingers across the skin: [Drag----------Slip]
d. Amount of residue	The amount of residue left on the surface of the skin: [None ----------Extreme]
e. Type of residue	Indicate the type of residue: Soap film, oily, waxy, greasy, powder
f. Dryness/ roughness	The degree to which the skin feels rough: [Smooth ----------Rough]
g. Moistness	The degree to which the skin feels moist: [Dry ----------Moist]
h. Tautness	The degree to which the skin feels taut or tight: [Loose/pliable ---------- Very tight]

Using edge of fingernail, scratch a line through the test site. Visually evaluate for:

i. Whiteness	The degree to which the scratch appears white: [None ----------Very white]

3. Application of Antiperspirant

Follow a statistical design and adhere to the right–left arm balance.

Roll-on, Direct Application: Sample is primed prior to application. Arm is held out at right angle to the body with the palm of hand perpendicular to the floor. The panel leader applies the product by stroking in a zigzag pattern to evenly cover the surface area of the rectangle. Count the number of strokes to achieve full coverage. Panel leader will weigh the sample before and after and panelists will record the total weight on the ballot.

Solids/gels: The panel leader applies the product by stroking up the arm once through the 6 in. × 2 in. rectangle (force to apply), then back down and up the arm three times (ease to spread), using a consistent pressure to get the product on the arm. A tare weight is taken after the fourth stroke. The weight must fall between the 0.20 and 0.25 g range. The panel leader continues with additional strokes until weight is reached and then records the weight and the number of strokes.

During application for roll-ons: Using the first two pads of just the index finger, run product across the entire site using a gentle oval motion—stroke at a rate of two strokes per second (This is done to ensure that the entire site is covered evenly.)

After three rubs, evaluate for:

a. Wetness — The amount of water perceived on the skin:
[None ---------- High amount]

b. Spreadability — The ease with which the product is spread on the skin:
[Difficult ---------- Easy]

4. Immediate Evaluation

Immediately after application, evaluate for:

a. Coolness — The degree to which the sample feels "cool" on the skin (somesthetic):
[Not at all cool ---------- Very cool]

b. Gloss — The amount of reflected light from the skin:
[Not at all shiny ---------- Very shiny]

c. Whitening — The degree to which the skin turns white:
[None ---------- Very white]

d. Amount of residue (visual) — The amount of product visually perceived on the skin:
[None ---------- Large amount]

e. Tautness — The degree to which the skin feels taut or tight:
[Loose/pliable ---------- Very tight]

Fold arm to make contact. Hold for 5 s. Unfold arm and evaluate for:

f. Stickiness (fold) — Degree to which arm sticks to itself:
[Not at all ---------- Very sticky]

Stroke finger lightly across skin on one section of rectangle and evaluate for:

g. Wetness — The amount of water perceived on the skin:
[None ---------- High amount]

h. Slipperiness — Ease of moving fingers across the skin:
[Drag ---------- Slip]

i. Amount of residue — The amount of residue perceived on skin (tactile). Evaluate by stroking finger across site:
[None ---------- Extreme]

j. Oil — The amount of oil perceived on skin:
[None ---------- Extreme]

k. Wax — The amount of wax perceived on skin:
[None ---------- Extreme]

l. Grease — The amount of grease perceived on skin:
[None ---------- Extreme]

m. Powder/ chalk/grit	The amount of powder, chalk, and/or grit perceived on skin: [None ----------Extreme]
n. Silicone	The amount of silicone perceived on skin: [None ----------Occluded]

5. Evaluation after 5, 10 or 15, and 30 Min. Evaluate for:

a. Occlusion	The degree to which the sample occludes or blocks the air passage to the skin: [None ----------Occluded]
b. Whitening	The degree to which the skin turns white: [None ----------Large amount]
c. Amount of residue (visual)	The amount of product visually perceived on skin: [None ----------Large amount]
d. Tautness	The degree to which the skin feels taut or tight: [Loose/pliable ----------Very tight]

Fold arm to make contact. Hold 5 sec. Unfold arm and

e. Stickiness	The degree to which arm sticks to itself: [Not at all sticky----------Very sticky]

Stroke fingers lightly across skin on one section of rectangle and

f. Wetness	The amount of water perceived on the skin: [None ----------High amount]
g. Slipperiness	Ease of moving fingers across the skin: [Drag----------Slip]
h. Amount of residue	The amount of residue perceived on skin (tactile). Evaluate by stroking finger across site: [None ----------Extreme]
i. Oil	The amount of oil perceived on skin: [None ----------Extreme]
j. Wax	The amount of wax perceived on skin: [None ----------Extreme]
k. Grease	The amount of grease perceived on skin: [None ----------Extreme]
l. Powder/ chalk/grit	The amount of powder, chalk, and/or grit perceived on skin: [None ----------Extreme]
m. Silicone	The amount of silicone perceived on skin: [None ----------Extreme]

6. Evaluation after 30 Min
Place a swatch of black fabric over test site. Fold arm so fingertips touch the shoulder. With arm still folded, pull fabric from crook of arm. Compare residue on swatch to visual scale provided.

a. Rub-off whitening	The amount of residue on the dark fabric: [None ---------- Large amount]

APPENDIX 12.2 SPECTRUM INTENSITY SCALES FOR DESCRIPTIVE ANALYSIS

The scales below (all of which run from 0 to 15) contain intensity values for aromatics (A) and for tastes (B) that were derived from repeated tests with trained panels at Hill Top Research, Inc., Cincinnati, Ohio, and with trained panels at Sensory Spectrum; and also for various texture characteristics (C and D) that were obtained from repeated tests at Hill Top Research or at Sensory Spectrum, or that were developed at Bestfoods Technical Center, Somerset, New Jersey.

New panels can be oriented to the use of the 0–15 scale by presentation of the basic tastes using concentrations of caffeine, citric acid, NaCl, and sucrose, which are listed under Section B. If a panel is developing a descriptive system for an orange drink product, the panel leader can present three "orange" references:

1. Orange drink Hi-C labeled "Orange Complex 3.0"
2. Reconstituted Minute Maid concentrate labeled "Orange Complex 7.5 and Orange Peel 2.0"
3. Tang labeled "Orange Complex 9.5 and Orange Peel 4.0"

At each taste test of any given product, labeled reference samples related to its aromatic complex can be presented so as to standardize the panel's scores and keep panel members from drifting.

A Intensity Scale Values (0–15) for Some Common Aromatics

Term	Reference	Scale Value
Baked white wheat	Ritz crackers (Nabisco)	6.5
Caramelized sugar	Tortilla chips (Frito Lay)	2
	Ketchup (Heinz)	3
	Bugles (General Mills)	4
	Bordeaux cookies (Pepperidge Farm)	4.5
Celery	V-8 vegetable juice (Campbell)	5
Cheese	American cheese, slices (Kraft Singles)	5
Cinnamon	Big Red gum (Wrigley)	12.5

(*Continued*)