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Standard Guide for Screening and Training of Assessors and a General Approach for the Sensory Evaluation of Oral Care Products: Toothpaste and Toothbrushes[1]

This standard is issued under the fixed designation E3288; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides guidelines for the selection and training of expert assessors for the sensory evaluation of toothpaste and toothbrushes as well as a basic framework for the sensory evaluation of the same. Sensory evaluation of toothpaste and toothbrushes can be used to define the sensory attributes of the products and then to measure those attributes quantitatively for the purposes of new product development, product optimization, competitive benchmarking, and claims substantiation.

1.2 A general framework for both toothpaste and toothbrush descriptive analysis is provided to guide the reader in the design and execution (including sample preparation and presentation, facility and testing environment, and specific evaluation protocols) for such evaluations.

1.3 This guide provides suggested protocols and approaches to the evaluation of the indicated products/samples and in no way excludes any alternate approaches that may be effective in providing such perceptual evaluations.

1.4 This guide does not address other oral care products including, but not limited to, whitening agents, oral rinses, mouthwashes, dental flosses, denture adhesive, floss picks, or other oral care products.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E253 Terminology Relating to Sensory Evaluation of Materials and Products

E1490 Guide for Two Sensory Descriptive Analysis Approaches for Skin Creams and Lotions

E2082 Guide for Descriptive Analysis of Shampoo Performance

3. Terminology

3.1 *Definitions*—Refer to Terminology E253 for common sensory terms that may be applied to the evaluation of toothpaste.

3.2 *Definitions of Terms Specific to Toothpaste:*

3.2.1 This list is in no means meant to be an exhaustive list of sensory attributes common to toothpaste but rather a list of example attributes that are commonly perceived in the use of toothpaste.

Flavor Attributes

3.2.2 *anise/licorice, n*—aromatics associated with sweet, spicy herbs containing anethole, for example, licorice gum and licorice candy.

3.2.3 *brown spice, n*—bark, buds, flowers, roots, fruit, and secretions of plants used to create pungency, bite, or character in foods and aromatics associated with a range of earthy, musty, woody, sweet, warm, citrus, terpeney, sassafras, brown spices that can include bitter and numbing, for example, cinnamon, cardamom, clove, mace, coriander, and nutmeg, 0.1 % allspice solution, and strong cinnamon chewing gum.

3.2.4 *chalky flavor, n*—aromatics associated with mineral salts such as chalk along with some cement-like and dusty notes, for example, chalk dust, milk of magnesia, calcium carbonate, and calcium oxide.

3.2.5 *earthy, adj*—aromatic associated with mushrooms, potatoes, and potting soil.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.2.6 *green (viney), n*—aromatic associated with plants, particularly with plant stems, for example, the aromatic associated with tulip stems.

3.2.7 *mint complex, n*—sum of the combination of several aromatics associated with mint such as wintergreen, spearmint, and peppermint.

3.2.7.1 *Discussion*—Other attributes associated with mint complex may include basic tastes and feeling factors such as: sweet, bitter, cooling, pungency, and menthol, all of which are rated separately.

3.2.8 *peroxide, n*—aromatic associated with hydrogen peroxide and can include astringency, soapy, prickly, vinyl impression, soured, and metallic taste and aftertaste, for example, 1:4 dilution hydrogen peroxide.

3.2.9 *soapy aromatic, adj*—aromatics associated with lipolyzed milk solids, hydrolyzed vegetable fat, tallow notes, or hydrolyzed animal fat, or combinations thereof.

3.2.10 *spearmint, n*—aromatics associated with spearmint.

3.2.10.1 *Discussion*—Other associated characteristics with spearmint typically include sweet, bitter, green notes, and cooling (though typically not as intense as peppermint), all of which are rated separately, with slightly less burn than peppermint.

3.2.11 *thymol-eucalyptol, n*—aromatics associated with the aroma of eucalyptus trees that include piney/rosemary and phenolic/medicinal.

3.2.12 *unripe (green) fruit, n*—aromatic associated with underdeveloped fruit, for example, green bananas.

3.2.13 *warming, v*—perception of chemical heat associated with substances such as brown spice and low levels of capsaicin.

3.2.14 *wintergreen, n*—combination of several sweet aromatics associated with the mint family having some green and menthol aromatics along with a methyl salicylate aromatic sensation.

3.2.14.1 *Discussion*—Other associated characteristics with wintergreen typically include warming, low-level burning, and cooling, which are rated separately. Non-category examples: wintergreen breath mints and typical bismuth subsalicylate stomach remedies.

Texture/Mouthfeel and Holistic Attributes

3.2.15 *baking soda complex, n*—metallic, salty, mouth coating with radiating burn feeling, including mouth slip, for example, 0.1 % baking soda solution and unflavored seltzer water.

3.2.15.1 *Discussion*—The study designer may choose to separate this complex attribute into more granular attribute measures.

3.2.16 *bicarbonate feeling factor, n*—additionally can be recognized as the chemical feeling factor associated with sodium bicarbonate.

3.2.17 *chalky feel, n*—textural perception of small particulates.

3.2.18 *foam, n*—characteristics of the bubbles produced during the use of the product and this may specifically include more granular measures such as: foam amount, foam uniformity, and denseness of bubbles produced.

3.2.19 *gritty, adj*—sensation of coarse, hard particles perceived in the mouth, for example, quick-dissolving antacid (calcium carbonate) tablets and granulated sugar.

3.2.20 *menthol, n*—"green" aromatic with associated nasal pungency and cooling feeling factor (and burning at higher levels) while in the mouth, for example, menthol and eucalyptus cough drop and mentholated topical cough suppressant ointment.

3.2.21 *overall impact, n*—sum total of the sensory impressions (sensations) of the sample in the mouth that includes aromatics, basic tastes, and feeling factors.

3.2.22 *peppermint, n*—aromatics associated with peppermint leaves.

3.2.22.1 *Discussion*—Other associated characteristics with peppermint typically include sweet, mint, cooling, green notes, bitter, and pungency, all of which are rated separately. Non-category examples of peppermint include peppermint gum and candies.

3.2.23 *pins and needles/numbing/stinging, n*—feeling factor associated with a sharp, stinging sensation that can be intense and includes a decrease or loss of sensation (numbing) often as a result of intense carbonation and a reaction to strong flavoring oil, essence, or extracts, for example, rinsing the oral cavity with hydrogen peroxide and then expectorating.

3.2.24 *slick, adj*—measure of the lack of resistance to tongue movement across the surface of the teeth.

3.2.25 *soapy mouthfeel, adj*—alkaline and slippery feel on the soft tissues of the mouth.

3.2.26 *toothpaste, n*—powder, paste, gel, or liquid for cleaning the teeth with the primary clinical benefit being the prevention of dental caries.

3.2.26.1 *Discussion*—Toothpaste products may or may not contain a form of fluoride as the common active ingredient and are generally intended for application with a toothbrush or similar device.

3.3 *Definitions of Terms Common to the Perception of Toothbrushes:*

3.3.1 *bristle, n*—short, hair-like structure, usually made of synthetic material with varying degrees of stiffness (or firmness).

3.3.1.1 *Discussion*—Other bristle attributes associated with toothbrushes can include: deformation of bristles over time, bristle length, and bristle density.

3.3.2 *handle, n*—part of an instrument or thing by which it is held, carried, or controlled.

3.3.2.1 *Discussion*—Attributes to consider regarding handle may be comfort, ability to control, length, roughness, slipperiness, circumference, diameter, shape, and feel of composition material.

3.3.3 *toothbrush, n*—oral hygiene instrument used to clean the teeth, tongue, and gums and the instrument consists of a head of tightly clustered bristles embedded in a handle that facilitates the cleansing of teeth surfaces and soft tissues of the mouth.