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Standard Guide for Sensory Evaluation of Beverages Containing Alcohol¹

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1. Scope

1.1 This guide provides guidelines specific to the sensory and consumer evaluation of alcoholic beverages, including but not limited to beer, wine, coolers, cocktails, ready to drinks, liqueurs, hard ciders, hard seltzers, and distilled spirits.

1.2 This guide covers assessor selection, sample preparation, serving protocols, and evaluation recommendations for specific alcoholic products.

1.3 This guide addresses safety, regulatory, and legal concerns, but does not cover all legal rules for alcohol and sensory evaluation around the world. It is the responsibility of the user to be aware of their current local laws and regulations, corporate policies and procedures, and confirm they haven't changed since publication.

1.4 This guide does not cover the evaluation of raw materials or specific test methods.

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](#)

¹ This guide is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation and is the direct responsibility of Subcommittee E18.06 on Food and Beverage Evaluation.

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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.

[E1871 Guide for Serving Protocol for Sensory Evaluation of Foods and Beverages](#)

3. Terminology

3.1 For definitions of terms relating to this standard, see Terminology [E253](#).

4. Significance and Use

4.1 This guide outlines considerations for selecting assessors who will evaluate alcoholic beverages and recommends procedures for the evaluation of specific alcoholic beverages.

4.2 This guide gives practical suggestions to maximize assessor safety and minimize the liabilities of the person or corporation responsible for administering sensory evaluations of alcoholic beverages.

4.3 This guide provides examples of informed consent forms for both Central Location Tests and Home Use Tests (see [Appendix X2 – Appendix X4](#)).

5. Safety

5.1 *Medical Condition*—Potential assessors must be in good medical condition with no serious health problems. Inform them that they should not participate on panels if they are taking prescription or over-the-counter medications that are contraindicated when combined with alcohol. It is recommended that women who are pregnant, may be pregnant, or nursing should not participate. Recruiting should be conducted in such a way to ensure that those not meeting these medical requirements are excluded from participation.

5.2 A sufficient waiting period should be arranged before assessors are allowed to drive or operate heavy machinery after sampling test product(s).

5.3 All products should be stored in a place where they are only accessible to individuals of legal drinking age.

5.4 *Recommended Serving Volumes:*

5.4.1 Alcohol is measured in units of standard drinks. However, the amount of alcohol in a standard drink differs between countries, so caution should be taken if sensory testing is being conducted across different countries (**1**, **2**).³ It is

³ The boldface numbers in parentheses refer to the list of references at the end of this standard.

easiest to convert between different countries' standard drinks using grams (3). See Table 1 for examples of standard drink amounts from six different countries.

5.4.2 Standard drink equivalents are a unit of measurement frequently used to help consumers more easily understand the units of alcohol consumed. In the United States the standard drink of 14 grams of alcohol is 355 mL (12 oz) of 5 % beer, or 148 mL (5 oz) of 12 % wine, or 44 mL (1.5 oz) of 40 % distilled spirit (4). For several countries, the standard drink amount and the equivalent standard drink in the United States can be found in Refs. (3) and (5); examples for six countries are given in Table 1 (3, 5).

5.4.3 Limit the sample volume for evaluation to an amount which will ensure the respondent will not have a Blood Alcohol Concentration (BAC) greater than the legal limit.

5.4.3.1 BAC levels are either reported as the mass of alcohol per volume of blood (for example, United States, France, and Poland) or the mass of alcohol by mass of blood (for example, Norway and Russia). It is important to understand the units of BAC and know the BAC legal limit in countries, and regions within those countries, in which a sensory study is being conducted (6).

5.4.3.2 Tables 2 and 3 indicate how to calculate the BAC for males and females, respectively, based on weight and number of drinks consumed (7). It can be used to calculate the number of samples that can be served to assessors during a testing session.

5.4.4 Recommended serving volumes based on alcohol content can be calculated using the formula:

$$SV1 = \frac{SA2 \times SV2}{SA1} \quad (1)$$

where:

- SA1 = sample alcohol content,
- SV1 = total volume to be given to assessors = unknown,
- SA2 = "standard drink" alcohol content, and
- SV2 = "standard drink" volume.

NOTE 1—See Appendix X1 for further explanation and worked examples using the formula.

5.4.4.1 If sample volume would result in a BAC above the legal limit, testing should occur over multiple days.

5.4.4.2 Assessors should not have consumed alcohol the day on which they are participating in a sensory test containing alcoholic beverages.

5.4.5 If possible, sensory testing should occur earlier in the day to allow a waiting period if assessors are driving after testing and need time for their BAC to reduce.

5.4.5.1 After drinking ceases, the BAC increases for a short amount of time, then it slowly decreases at a rate of approximately 0.015 to 0.02 % per hour (see Table 4) (7, 8).

TABLE 1 Standard Drink Amount Examples

Country	Standard Drink Amount (g)
Australia	10
Chile	14
France	12
Japan	19.75
South Africa	11.5
United States	14

(1) Example: a 150 lb female consumes two drinks resulting in a BAC of approximately 0.068 %. At the most conservative elimination rate of 0.015 %, it will take 4.5 hours after the drinking session for her BAC to go from ~0.068 to ~0.0 %. To be deemed 'sober,' BAC is required to be at 0.0 and legal levels of BAC for operating a vehicle vary by locale and can be as low as 0.0.

5.4.5.2 In cases when a waiting time is not attainable, or in locations where no amount of alcohol is deemed acceptable for driving, public transportation, a taxi, or a designated driver should be arranged.

5.4.5.3 Consideration should also be given to how much alcohol may cause impairment, even if an assessor's BAC is below the legal limit. Some individuals are more sensitive to the effects of alcohol and so both BAC and impairment limits should be considered when serving samples.

5.4.6 If there are concerns about assessors' BAC before or after consuming products, their BAC may be measured, for example, with a breathalyzer.

5.5 When using employees as assessors, special consideration must be taken when their work involves the operation of equipment or any work task that can jeopardize the safety of others. Either do not allow these employees to be assessors or arrange with employee management "waiting times" after product evaluation before these employees can resume work involving these safety-related work activities.

5.5.1 Consider serving fewer samples so the assessor's BAC is less than the legal limit if they taste alcohol everyday as a function of their work.

5.6 Safety Data Sheets (SDS) for ethanol should be stored on the study site premises and made available upon request to participants. Additionally, SDS should be available for compounds used as reference standards or for sensory training.

5.7 Additional resources specific to understanding the effects of age, weight, gender, and food consumption on rate of BAC change over time can be found in Ref. (9).

6. Regulatory and Legal Liability

6.1 Investigate and meet federal, state/provincial, and local regulations whenever studies on alcoholic beverages are to be conducted. Note that the type of alcoholic beverage (beer/malt, wine, or spirit) may influence the regulatory requirements or the government agency that has jurisdiction.

6.2 Look for regulatory information through government agencies. Some examples include:

6.2.1 *Australia*—Food Standards Australia New Zealand, Australian Taxation Office (ATO) (10, 11).

6.2.2 *Chile*—Servicio Agrícola y Ganadero (SAG) (12).

6.2.3 *France*—Republique Francaise Service-Public (13).

6.2.4 *Japan*—National Tax Agency (14).

6.2.5 *South Africa: Department of Agriculture, Land Reform, and Rural Development* (15).

6.2.6 *United States*—Federal Tax and Trade Bureau (TTB), state/local Alcohol Beverage Commissions (ABCs), Food and Drug Administration (FDA), and Occupational Safety and Health Administration (OSHA) (16-18).

TABLE 2 Blood Alcohol Concentration (BAC, %) Chart for Males

Weight (lb)	Number of Standard USA Drinks ^A Consumed									
	1	2	3	4	5	6	7	8	9	10
100	.043	.087	.130	.174	.217	.261	.304	.348	.391	.435
125	.034	.069	.103	.139	.173	.209	.242	.278	.312	.346
150	.029	.058	.087	.116	.145	.174	.203	.232	.261	.290
175	.025	.050	.075	.100	.125	.150	.175	.200	.225	.250
200	.022	.043	.065	.087	.108	.130	.152	.174	.195	.217
225	.019	.039	.058	.078	.097	.117	.136	.156	.175	.195
250	.017	.035	.052	.070	.087	.105	.122	.139	.156	.17

^A One standard USA drink of 14 grams of alcohol is 355 mL (12 oz) of 5 % beer, or 148 mL (5 oz) of 12 % wine, or 44 mL (1.5 oz) of 40 % distilled spirit.

TABLE 3 Blood Alcohol Concentration (BAC, %) Chart for Females

Weight (lb)	Number of Standard USA Drinks ^A Consumed									
	1	2	3	4	5	6	7	8	9	10
100	0.05	0.101	0.152	0.203	0.253	.304	.355	0.406	.456	.507
125	0.04	0.08	.120	0.162	0.202	0.244	0.282	.324	.364	.404
150	0.034	0.068	0.101	0.135	0.169	0.203	0.237	.271	.304	.338
175	0.029	0.058	0.087	0.117	0.146	0.175	0.204	.233	.262	.292
200	0.026	0.05	0.076	0.101	0.126	0.152	0.177	.203	0.227	.253
225	0.022	0.045	0.068	0.091	0.113	0.136	0.159	.182	.204	0.227
250	0.02	0.041	0.061	0.082	0.101	.122	0.142	.162	.182	.2

^A One standard USA drink of 14 grams of alcohol is 355 mL (12 oz) of 5 % beer, or 148 mL (5 oz) of 12 % wine, or 44 mL (1.5 oz) of 40 % distilled spirit.

TABLE 4 Amount of Time to Reduce BAC (mg of alcohol per 100 mL of blood)

Hours since first drink	1	2	3	4	5	6
Subtract from BAC	.015	.030	.045	.060	.075	.09

itehStandards
(https://standards.iteh.ai)

6.3 Research and meet regulations for all aspects related to the sensory testing of alcoholic beverages, including:

- 6.3.1 Obtaining permits and filling required documents.
- 6.3.2 Preparing facility, such as posting government warnings for the consumption of alcoholic beverages on test premises.
- 6.3.3 Labeling of products. Some examples include mandatory disclosures on packaging, labelling each product container individually, or applying a “not for resale” label for Home Use Testing products.
- 6.3.4 Shipping and handling of samples including customs clearance if product is being shipped between regions or internationally.
- 6.3.5 Product procurement, such as any requirements that products must be purchased in the same regulatory jurisdiction (for example, product must be purchased in the state that it will be tested), and if prototypes can be tested or not.
- 6.3.6 Receiving product.
- 6.3.7 Storing product.
- 6.3.8 Serving product:
 - 6.3.8.1 Alcohol serving certifications or use of a certified bartender may be required for those serving alcohol.
- 6.3.9 Serving food, which may be required in some locations but prohibited in others.
- 6.3.10 Travel of assessors, may require a designated driver or that assessors take a breathalyzer before, after or both for participation.
- 6.3.11 Disposing of unused packages.

6.4 Research and meet requirements on types of testing allowed which may also vary among locales in which testing is being conducted. Each of these may be allowed with or without compensation:

- 6.4.1 Testing with consumers at a market research facility.
- 6.4.2 Testing with consumers at a bar.
- 6.4.3 Testing with consumers in their home.
- 6.4.4 Testing using employees.
- 6.4.5 Testing using trained panelists.
- 6.4.6 Testing with bartenders.

6.5 Ethical review boards may be considered or required for example, Internal Review Board in the United States or a company’s legal department.

6.6 There is a risk of legal liability whenever alcoholic beverages are tested. To minimize these risks, it is recommended that a consent form be used for each product evaluation session or test. These may be required in some locales. Below is the information that should be in the consent form. Examples are provided in **Appendix X2 – Appendix X4**.

6.6.1 Describe the nature of the study. For example, the sentence, “You may or may not be served beverages that contain alcohol,” can be used to obtain informed consent.

6.6.2 Outline the time period over which testing will be conducted.

6.6.3 Include all legally required alcohol warning information.

6.6.4 Indicate that for the candidate to participate in the study they must be in good health and are willing to participate as evidenced by the signing of the informed consent form.

6.6.5 Indicate that participants may be excluded from the study for specific reasons including pregnancy, taking prescribed medications, current illnesses, and alcohol abuse. Furthermore, indicate that if any of the exclusion circumstances arises during the course of the study it is the participant's responsibility to bring it to the organizer's attention. This is particularly important for long-term studies, where periodic reviewing and signing of consent forms may be necessary.

6.6.6 Under certain circumstances, include a list of ingredients on the consent form mentioning all the products to be tested as per local regulatory regulations, for example level or range of alcohol, caffeine, aspartame, capsaicin, sulfites, or specific allergens.

6.6.7 Include statements indicating participants can be removed from the study without consent at any time. Statements should also be included indicating the participant can withdraw at any time.

6.6.8 Each participant is required to provide appropriate validation of legal age to consume alcoholic beverages. If legal drinking age and legal purchase age are different in a particular locale, the higher should always be selected. Record this validation on the consent form. Note that laws concerning legal drinking age vary by country and may vary within a country.

6.6.9 Upon completion of reading the consent form, ensure that the participant understands the form and has no questions. After being allowed ample time to review the contents of the consent form, the participant must sign and date the consent form in the presence of a witness.

7. Assessor Selection

7.1 Consider safety, regulatory, and liability issues as discussed in Sections 5 and 6 when selecting participants specifically for alcoholic beverage testing. For general information on assessor selection criteria, consult ASTM MNL26 and STP758 (19, 20).

7.2 *Special Considerations on Selection Criteria:*

7.2.1 *Age*—All assessors must be of legal drinking age. Confirm their age by using picture identification cards, such as a driver's license, passport, or other photo identification listing the assessor's date of birth.

7.2.1.1 In some countries, legal drinking age and legal purchase age for alcoholic beverages may be different. The higher of the two should be used.

7.2.1.2 A table of legal drinking ages around the world can be found on the website for the International Alliance for Responsible Drinking (21). Some examples of ages in which persons can freely (that is, not in the presence of a consenting adult) consume and buy alcohol include:

- (1) *Australia*—18 years old.
- (2) *Chile*—18 years old.
- (3) *France*—18 years old.
- (4) *Japan*—20 years old.
- (5) *South Africa*—18 years old.
- (6) *United States*—21 years old.

7.2.1.3 For consumer or affective testing, ensure the time frame of past consumption or purchase behavior only includes time in which the consumers were of legal drinking age.

7.2.2 *Drinking Habits*—Product abuse is a criterion for exclusion for all alcoholic beverage tests. Assessors should arrive for testing having not had any alcoholic beverages the day of the sensory testing. Do not use individuals who indicate that they, on average, consume more than the recommended daily amount.

7.2.3 *Religious and Moral Considerations*—Do not use individuals if drinking alcoholic beverages interfere with or contradicts their religious or moral beliefs.

8. Sample Preparation

8.1 All test conditions and serving procedures are determined by the test objective, test method, test design, and decision risk. For example, consumer studies may require preparing samples as they are typically consumed, whereas a Quality Control based study may require samples be diluted to a specific amount.

8.1.1 Conditions and procedures should remain consistent across testing whenever possible for comparison.

8.1.2 *Pretest*—A practice session may be conducted with a few staff members or assessors to determine if the selected preparation methods are appropriate for the purposes of the test.

8.1.3 *Product Variability*—Variability exists in all products. How product variability is handled depends on the objective of the test, the size of the effect one is attempting to measure, and the risks associated with decision-making. Unless the test is designed to understand the extent of product variability, the test variables should be controlled to minimize variation of the stimuli to which each assessor is exposed. Variability should, however, not be minimized to the extent where the sample is not representative of the typical variability found in the product. See Guide E1871 for more.

8.2 Product age should be consistent among all samples and as fresh as possible unless this conflicts with the purpose of the study.

8.3 Consider a product's exposure to the environment. Sunlight, indoor lighting, air ingress, temperature, contact vibrations, and so forth can affect the physical nature of a product.

8.4 All storage containers should be inert. Further material considerations should be made based on the type of product.

8.5 For carbonated beverages, pretest to determine appropriate preparation and storage to avoid loss of carbonation. Ideally a new package will be opened after a pre-determined set of time or an unopened or newly opened package is served directly to the assessor. It is not recommended to combine smaller package types into a larger one (for example, several cans into a pitcher) as the carbonation will decrease more quickly. If it is necessary to combine smaller containers, ensure the larger container has a tight-fitting lid that will not allow CO₂ to escape.

8.5.1 Similar procedures should be conducted for nitrogenated beverages.

8.6 For beverages stored and served at hot or cold temperatures, consider how to maintain appropriate temperature. Insulated flasks or carafes are recommended for hot beverages to avoid imparting a “cooked” aroma, though hot plates or a hot water bath could also be used. For cold beverages, a refrigerator is recommended but an ice bath could also be used if the temperature can be regulated. Temperature measurements should be taken throughout testing and holding of samples to ensure consistency in served product temperature.

8.7 For room temperature products, ensure the room temperature is not fluctuating between and within testing days.

8.8 Dilution may be chosen for distilled spirits due to high proof; however, this dilution can affect the sensory properties in some products.

8.8.1 Dilution amount should be determined according to the percent alcohol in the product and should remain consistent throughout testing.

8.8.2 Dilute products with liquid that will impart minimal flavor, such as spring water, distilled water, or demineralized water. Diluents should be pre-screened to ensure they do not contribute flavors. Consider combining water containers into a common lot to minimize variability.

8.9 Alcoholic products used with mixers can be presented straight or with the mixer (such as juice, cola or tonic water). When a mixer is used, it is recommended to prepare a master batch of the mixer or common lot purchased for the entire study (best when mixer is carbonated, for example, cola or tonic water). If this is not possible, the mixer should be screened before use for flavor consistency and stability throughout the study.

8.10 Home Use Tests (HUT) require different preparation to ensure assessor instructions for receiving and consuming the product are as clear as possible.

8.10.1 Consider how samples will be received by the assessor. For example, samples may be picked up by the assessor at a central location, delivered by the sensory professional, or shipped directly to the assessor.

8.10.2 If samples are being picked up by the assessor, ensure the instructions to place the product out of any person’s reach in the vehicle and inform the assessor it should not be opened until they arrive home.

8.10.3 Consider providing a cooler if samples must remain cold.

8.10.4 If samples are being shipped:

8.10.4.1 Ensure samples can be shipped legally. For example, in the United States some states do not allow alcohol to be shipped across their borders or directly to consumers.

8.10.4.2 Consider shipping conditions (for example, time of delivery, temperature of shipment), and ensure product is received by a person of legal drinking age.

8.10.5 Provide detailed instructions to the assessor for storing and consuming products, including storage away from those under legal drinking age.

8.10.6 If empty sample containers or unused product must be returned to the sensory professional, provide instructions to

the assessor detailing how to return them (for example, shipping or dropping off at a specified location).

9. Serving Protocol

9.1 The assessor serving container should reflect the nature of the study. For example, quality control studies may use smaller containers, whereas consumer studies may use larger containers or have consumers drink directly from the package as they might do for a canned beer.

9.2 If assessors will drink directly from the package, ensure the package is clean prior to serving.

9.3 If serving containers are being used instead of the package itself, several aspects should be considered.

9.3.1 Assessor serving containers should be inert and odorless. Glass is recommended but should be checked frequently and discarded if cracks or scratches are found as they can create a safety hazard and impart an odor. Plastic may also be used but should be pretested to confirm it is inert and odorless.

9.3.2 Consider what shape and size of serving container would best suit the product category and the testing goals.

9.3.3 For cleaning serving ware, if the product to be tested has foam (for example, beer) consider employing a sterilization step instead of detergent cleaner. If not properly rinsed, detergents can harm foam formation and stability.

9.3.4 Consider the opacity of the serving container; some studies may want to prevent the assessor from viewing the product and others may desire a visual evaluation through a transparent container.

9.3.5 Covers may be used to aid in aroma evaluation of the headspace if appropriate for the study, such as for quality control or descriptive analysis. It is not recommended to use covers for consumer studies in order to better mimic real-world evaluation scenarios.

9.4 Beverages should be served at a temperature appropriate for the product and test design. See [Table 5](#) for guidelines on common alcoholic products, though pretesting to confirm serving temperature is recommended. Temperature consistency between products of a similar style is more important than achieving the exact recommended temperature.

9.4.1 Pretesting should be conducted to determine how long a product may be in an assessor’s glass before the temperature change is unacceptable. Alternatively, assessors may be asked to measure the temperature of their samples before they consume them to ensure they are at the proper serving temperature.

9.5 If ice is added, the water source used, number of pieces, and piece size should be consistent (see [8.8.2](#) for water source). Pre-screen ice for clarity, absence of off-odors and flavors, and inappropriate mouthfeel effects, for example, from water hardness or ice purification technologies. Pretesting is recommended to determine how long a product may be in an assessor’s glass before ice dilutes the product too much. The product should always be at the same temperature (for example, refrigerated at 4 °C) before ice is added to minimize uneven melting rates.

TABLE 5 Recommended Serving Temperatures for Alcoholic Products^A

Alcoholic Product	Specific Style	Serving Temperature (°C)	Serving Temperature (°F)
Hard Cider	Sparkling	3-7	38-45
Hard Cider ^B	Still or Sweet	10-13	50-55
Wine	White: light and dry	4.5-10	40-50
Wine	White: full-bodied	10-15.5	50-60
Wine	Rose	4.5-10	40-50
Wine	Sparkling	4.5-10	40-50
Wine	Red: light and fruity	10-15.5	50-60
Wine	Red: full-bodied	15.5-18	60-65
Beer	Lager	4	40
Beer	Ale	10-13	50-55
Ready to Drink (hard seltzer, flavored malt beverage)	n/a	3-7	38-45
Distilled Spirits	Neat	20-22	68-72
Distilled Spirits	In mix	3-7	38-45
Hot	n/a	66-71	151-160
Frozen ^C	n/a	-7 - -2	19.5-35.5

^A References for table: (22-25).

^B The sweeter the cider, the colder it should be served.

^C The exact temperature is dependent on the product's alcohol content. Samples with a lower alcohol content require a higher serving temperature to prevent the sample from freezing completely.

9.5.1 Reusable ice cubes may also be used (for example, whiskey stones), which avoids concerns about ice diluting the product, but must be pre-tested to ensure they do not affect product flavor.

9.6 For carbonated and nitrogenated beverages, pretest to determine how long a product may be in an assessor's glass before the carbonation or nitrogenation drops an unacceptable amount.

9.6.1 When pouring carbonated or nitrogenated beverages, pour from a consistent height and speed to ensure uniform foam development and carbon dioxide or nitrogen gas release.

9.7 Blended samples should be evaluated immediately after preparation to avoid separation.

9.8 Products can be presented in different orders based on project objectives.

9.8.1 Ordered based on flavor intensity, in which products are presented from least to most intensely flavored. Sources of intense flavors may include alcohol content, hops, added flavors, or sugar. Pretesting may be required to determine the most appropriate order.

9.8.2 Ordered based on alcohol content, in which products are presented from lowest to highest alcohol by volume.

9.8.3 Ordered based on a randomization design.

10. Sample Evaluation

10.1 Palate cleansers should be used between all samples and are important for reducing sample carryover and adaptation.

10.1.1 Consider the most appropriate palate cleanser for the product category. Liquid palate cleansers like distilled water should always be used. It is not recommended to use carbonated water, as it can depress bitterness perception (26). Solid palate cleansers like unsalted crackers may be used but may impart their own flavor and should be used only if water does not effectively cleanse the palate.

10.1.2 Pretesting may be required to determine the most appropriate palate cleanser for the product category.

10.1.3 Enforce the use of palate cleansers to ensure all assessors are receiving the same cleansing between products.

10.2 Interstimulus interval is the amount of time between sample evaluations and, like palate cleansers, is important in reducing stimulus carryover and adaptation. The interstimulus interval should be balanced with memory effects, in which waiting too long between samples may cause assessors to forget a previous sample's sensory profile when a comparison is required for the project objective.

10.2.1 The more intense a sample's flavor, the longer the interstimulus interval should be.

10.2.2 Pretesting should be done to determine the appropriate length of time of the interstimulus interval.

10.3 Samples may be expectorated instead of ingested, but the decision to expectorate must be decided upon for all assessors, as switching between the two can affect product evaluation.

10.3.1 Large (20 oz or 590 mL) odorless, disposable opaque cups with opaque lids should be used for expectoration. Assessors can discretely expectorate into the cup once they've evaluated a sample.

10.3.2 In some locales, expectoration may be required by law.

10.4 *Sample Evaluation by Trained Assessors*—It is important to train all assessors to evaluate products the same way to minimize experimental variability. A recommended evaluation method for trained panels is provided below, though the testing method used should be determined based on the product and testing objectives.

10.4.1 General evaluation procedure includes four sensory modalities: visual, aroma, flavor, and mouthfeel. Steps 10.4.1.1 through 10.4.1.3 should be done sequentially. Visual (step 10.4.1.1) could be evaluated first if the sample size is limited or could be evaluated last to minimize bias from, for example, particulate in the sample. Consider providing a new sample for any of the modalities so that the integrity of the product is preserved, and adequate sample is available.

10.4.1.1 *Visual*—Observe visual attributes. Aspects to pay attention to may include color, haziness, particulate amount, particulate size, carbonation bubbles, foam, lacing, coating on the glass (lacing and legs), and viscosity.

(1) This can be done by holding the glass up to the light, putting the sample in front of a white background, or using a light box.

10.4.1.2 *Aroma*—Aroma evaluations should be conducted with the sample covered except when actively smelling the sample.

(1) Swirl the glass gently for 2 s. Slowly move it towards the nose, until it is just possible to smell the sample. As soon as it can be smelled, move the glass away. Repeat as necessary.

(2) Swirl the glass gently for 2 s. Move the glass past the nose horizontally in one swift movement. Repeat as necessary.

(3) Swirl the glass gently for 2 s. Put the nose in the glass and perform several short sniffs.

(4) Swirl the glass gently for 2 s. Put the nose in the glass and perform one long sniff for 2 s.

(5) Swirl the glass gently for 10 s. Put the nose in the glass and perform one long sniff for two seconds.

10.4.1.3 *Flavor*:

(1) *Aromatic*—Take a sip of sample, coat the mouth, and swallow or expectorate. Then breathe out hard through the nose.

(2) *Taste*—Taste may be evaluated with or without the nose plugged. When the nose is plugged, it eliminates aromatics, so taste is the sole perception. To evaluate taste with the nose plugged, assessors should plug the nose, take a sip, and coat the

mouth while evaluating taste. Swallow or expectorate the sample, then, without unplugging the nose, breathe through the mouth until aftertaste has been evaluated.

(3) *Mouthfeel*—Assessors should take a sip of sample and gently move it around in the mouth while evaluating mouthfeel. Swallow or expectorate the sample and continue evaluating mouthfeel.

10.5 Notable product-specific differences in sample evaluation are listed below:

10.5.1 *Cold Carbonated Beverages*:

10.5.1.1 Consider the length of the session so that beverages do not lose excessive carbonation or become too warm.

10.5.2 *Wine*:

10.5.2.1 Consider the glass shape based on the wine style (27).

10.5.3 *Distilled Spirits*:

10.5.3.1 When tasted neat, distilled spirits can have significant mouth burn and so a minimum of two sips may be necessary to perceive aromatics when tasting high proof spirits.

(1) Glassware used should be shaped as a bowl that narrows at the rim, such as the Glencairn, snifter, or any tulip-shaped glass with or without a stem.

10.6 In consumer product evaluations there is typically no instruction given as to how the consumer should evaluate the product. It is appropriate to consider the common way a product is consumed (for example, neat or with a mixer) and ensure the samples are prepared according to common consumption habits (see Section 8 for Sample Preparation), unless this conflicts with the purpose of the study.

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