

# THE SOCIETY OF FLAVOR CHEMISTS, INC.

## TESTING PROTOCOL

The following describes how one may earn membership under The Society of Flavor Chemists (SFC) guidelines, and in compliance with its' by-laws, shall be upheld through the actions of The Society of Flavor Chemists Membership Committee (SFCMC). Candidates for membership should ensure validity of their candidacy as outlined in the SFC by-laws before submitting an application for membership. The SFC Membership Committee Chair will review the candidate applications to confirm compliance with the requirements stated in the by-laws. The SFC Syllabus acts as a guide for expected knowledge content of a candidate and for development of written and verbal inquiries for the SFCMC interview process.

### **SFC Candidate for Membership Interview Process**

- 1. Candidates for SFC Membership will be asked to complete a written test followed by a verbal interview. Sufficient time will be allowed for both the testing and interview process:**
  - a. Both written responses and verbal interviews are generally administered at an SFC Meeting
  - b. An hour for written responses followed by an hour for verbal interview is a usual time allowance
  - c. Additional time of approximately 15 minutes shall be available should the candidate show steady and thorough advancement in the process
  
- 2. A written test consisting of 25-30 free response questions shall be presented to the membership candidate:**
  - a. Short written responses should be communicated in order to display candidate's knowledge to the membership committee
  - b. Aroma chemical identification exercises, via samples of flavoring item solutions, shall be included as part of the 25-30 questions
  - c. All questions stem from knowledge content areas stated in the SFC syllabus
  - d. If during the verbal interview process, it is determined that an Apprentice candidate has enough qualifications, e.g. time, experience, qualified responses, to be raised to the level of Certified, a recommendation may be made that the candidate be voted straight to Certified.
  
- 3. The written response test will be reviewed by members of the SFC Membership Committee (SFCMC):**
  - a. The SFCMC members shall agree with criteria set by the SFC by-laws Article II Sections 1c and 2c and as restated in this document section 4 (below)
  - b. The written response test shall act as an indicator to the interview team of the expertise and limitations of the candidate
  - c. SFCMC members who have a history of mentorship or camaraderie with a candidate shall voluntarily omit themselves from the candidate's interview evaluation process

- 4. The candidate shall be verbally interviewed by the SFCMC members who have proficiently reviewed the candidate's application for membership and written responses:**
  - a. Apprentice candidates should exhibit a sufficient knowledge of raw materials, compounding techniques, flavor formulation/production processes, regulatory and flavor applications to be able to proceed to an independent mode of creativity
  - b. Certified candidates must exhibit working knowledge of the flavor industry, namely raw materials, laboratory practices, production procedures, legal/regulatory consideration, and the economics involved in the creation, production and utilization of flavors
  
- 5. The SFCMC shall determine if the candidate should be recommended for the level of membership to which the candidate had applied. For the written test:**
  - a. Apprentice candidates shall be allowed no more than 20% incorrect or incomplete responses
  - b. Certified candidates shall be allowed no more than 10% incorrect or incomplete responses
  - c. An SFCMC recommendation for membership shall be presented to the SFC membership for a vote at the first possible business meeting following the candidate's interview
  - d. If the SFCMC recommends a "no pass", the options shall be privately discussed with the candidate. The candidate's name shall remain confidential
    - i. Should the candidate have already earned Apprentice membership, and is in good standing with the by-laws, they will retain the level of Apprentice until they either time out or upgrade successfully.
  
- 6. The SFC by-laws for membership should be consulted for queries regarding sponsorship and years of training needed to be considered for membership. Should additional information be needed, the Membership Chair can be contacted at [membership@flavorchemist.org](mailto:membership@flavorchemist.org) .**

## **Commitment to The Society of Flavor Chemists Membership Standards**

The syllabus is intended to provide support and guidance to training programs and is the expected knowledge from which the SFCMC draws interview queries.

No attempt has been made to divide the subject matter into Certified and Apprentice SFC membership categories. Apprentice candidates should be prepared to present a solid understanding of aspects of flavor creation, with the presumption that the candidate may not yet have successfully and independently applied the practice. Certified candidates should be prepared to share a broad and deep knowledge, demonstrative of successful independent and original flavor creation skills. It is not likely, nor is it expected, that each candidate will know every aspect of flavor creation.

For the sake of objectivity, no single aspect of the membership interview process shall be more significant than the other. However, the verbal questions will reflect a weighting dependent upon the candidate's personal job experience. The expectation is that candidates sufficiently fulfill the allotted correct or complete answers on the combination of written and verbal inquiries.

The SFCMC is aware that people test differently (written versus verbal) and shall act to ensure each candidate is treated with fairness and equality. The committee's position is to ensure that the highest standards of protocol are practiced to perpetuate professionalism of the organization.

This document is a reiteration and elaboration of article II, 2,c of the SFC by-laws, which states that applicants for Certified Membership “must exhibit a working knowledge of...raw materials, laboratory procedures, production processes, legal/regulatory considerations, and the economics involved in the creation, production, and utilization of flavors.”

## Reference Information

Since there are no formal courses in Flavor Chemistry, most of a candidate’s knowledge and training comes from work experience, trial and error, and the counsel of more experienced practitioners of the art. Most candidates for SFC membership will find it useful or necessary to supplement their experience by consulting various published sources of information.

1. Steffen Arctander, *Perfume and Flavor Chemicals, Perfume and Flavor Materials of Natural Origin*
2. Burdock, *Fenaroli’s Handbook of Flavor Ingredients*
3. Dolf DeRovira, *The Dictionary of Flavors*
4. Ernest Guenther, *The Essential Oils*
5. Dr. Brian Lawrence, *Essential Oils*
6. Earl Merwin, *Flavor History*
7. Morrison and Boyd, *Organic Chemistry*
8. Gerald Mosciano, *Successful Flavors*
9. Gary Reineccius, *Flavor Chemistry and Technology, Source Book of Flavors*
10. John Wright, *Flavor Creation*
11. Allured Publishing, *Flavor and Fragrance Materials*
12. Code of Federal Regulations (CFR)
13. Food Chemical Codex (FCC)
14. Industry Periodicals including:
  - Perfumer & Flavorist
  - Journal of Agriculture and Food Chemistry
  - Food Technology
  - Food Processing
  - Cereal Food World
  - Prepared Foods
  - Food Chemical News
  - Food Product Design
  - Beverage World

## The Syllabus

### I. BASIC ORGANIC CHEMISTRY

#### Chemical Groups

Candidates should be able to identify the taste and aroma profile of the following chemical groups and demonstrate a working knowledge of their basic chemistry:

Carboxylic Acids  
Alcohols  
Aldehydes  
Esters  
Furans  
Ketones  
Lactones  
Macrocyclic Compounds

Nitrogen Compounds  
Phenols  
Sulfur Compounds  
Sesquiterpenes  
Terpenes  
Isomers: cis & trans; dextro & laevo  
Chemosensory Ingredients

#### Reactions and Shelf Life Considerations

The following are reactions that can occur. A general knowledge of these is expected. The discussion will revolve around prevention and/or flavor effect.

##### Primary:

Acetal Formation  
Esterification  
Maillard Reaction  
Polymerization  
Recrystallization  
Volatilization

Aging  
Fermentation  
Oxidation  
Precipitation  
Schiff Base

##### Secondary:

Aldol Condensation  
Chelation  
Cross Esterification  
Deamination  
Interaction  
Metal-Ion Complexation  
Neutralization  
Reduction  
Saponification  
Separation  
Trans Esterification

Amadori Rearrangement  
Condensation  
Cyclization  
Enzymolysis  
Interesterification  
Microbial Degradation  
Partitioning  
Salting Out  
Sedimentation  
Strecker Degradation  
Volatilization

### **Instruments / Methods**

**The following are instruments that are used in the industry. A general knowledge of these is expected. The discussion will revolve around quality assurance, accuracy and general descriptions of the tests.**

#### **Primary:**

Density Meter/Densitometer  
Refractometer Refractive Index/Brix  
Karl Fischer Titration or Moisture Analyzer  
Gas Chromatography / Mass Spectrometry  
Spectrophotometer/Colorimeter

Flash Point Tester  
pH Meter  
Water Activity Meter

#### **Secondary:**

Turbidity Meter  
Flame Ionization Detector  
FTIR Spectroscopy

Viscometer  
Particle Size Analysis  
Liquid Chromatography

## **II. CATEGORIES OF FLAVORING SUBSTANCES**

**Explain physical form, method of production and solubility of:**

Absolutes  
Concentrates (ex. Fruit juices)  
Concretes  
Distillates (fruit, cocoa, coffee)  
Enzyme Modified Cheeses  
Essential Oils (expressed & distilled)  
Extracts (tinctures and vanilla)  
Oleo-resins (resinoids)  
Citrus products

**Identify major chemical component which characterizes aroma/flavor of natural flavoring items including but not limited to:**

Almond	Cassia	Eucalyptus	Neroli Bigarade
Anise	Celery	Fennel	Onion
Basil	Cinnamon	Garlic	Orris
Bergamot	Clove	Horseradish	Peppermint
Black Pepper	Coriander	Jasmin	Spearmint
Bois de rose	Cumin	Lavender	Tarragon
Capsicum	Davana	Lemon	Thyme
Caraway	Dill	Mustard	Wintergreen

### III. FLAVOR LABELING

#### **FDA Flavor Declaration**

- Natural
- Natural WONF
- Natural Flavor Type
- Natural & Artificial
- Artificial

#### **USDA Labeling**

- USDA Organic/Natural Requirements
- Canada Amenability Requirements

#### **TTB Labeling**

- 0.1% Artificial Topnote
- Limited ingredient items

#### **Standard of Identity**

- Vanilla, etc.

#### **Allergens**

- United States
- Canada
- European Union

#### **Genetically Engineered Ingredients / Genetically Modified Organisms (GMO)**

### IV. NON-FLAVOR INGREDIENTS

#### **Solvents**

- Types: water soluble, oil soluble
- Appropriate uses in flavor design and application
- Advantages/Disadvantages of each

#### **Acidulants and Buffers**

#### **Carriers**

- Carbohydrates
- Gums
- Proteins
- Salts
- Sugars

#### **Colors**

- FD&C dyes, lakes
- Caramel
- Naturally derived

**Preservatives**

- Antimicrobial
- Antioxidant

**V. FLAVOR FORMS**

**Liquid**

- Water soluble
- Oil soluble
- Emulsion

**Dry**

- Powder blend
- Plated
- Spray drying
- Freeze drying
- Vacuum drying
- Drum drying
- Fluid bed drying
- Other dehydration methods

**Paste**

- Enzyme modified products

**VI. FLAVOR CREATION**

**The creation of flavor is at the center of our profession and candidates will be expected to discuss their creative thought process and approach to original flavor creation. Many correct responses to describing one's creative inclinations exist and candidates should be comfortable with explaining how the following flavor types can be originated.**

- Citrus and other Fruit Flavors
- Sweet and Brown Flavors
- Herb and Spice Flavors
- Dairy Flavors
- Savory Meat/Seafood Flavors
- Savory Vegetable Flavors

**Modifications of existing flavorings are also a large part of a Flavorist's profession. Candidates should be prepared to discuss flavoring items that shall be used to create versions of existing flavors that vary, at minimum, in the following taste descriptors:**

- |       |        |        |          |
|-------|--------|--------|----------|
| ripe  | juicy  | sweet  | meaty    |
| fresh | creamy | brown  | tropical |
| dairy | floral | green  | fruity   |
| minty | pulpy  | spicy  | fatty    |
| waxy  | nutty  | earthy | seedy    |

## VII. FLAVOR ORGANIZATIONS AND CERTIFICATIONS

**The candidate should show a general knowledge of many of these ideas as it relates to the regulation of flavors worldwide.**

### **Alcohol, Tobacco, Tax & Trade Bureau (TTB) – Examples:**

- CFR Title 2
- Formulas Online / COLA
- Flavor Ingredient Data Sheets (FIDS)
- Fit versus Unfit
- Potability
- Drawback

### **United States Department of Agriculture (USDA) – Examples:**

- CFR Title 9
- Food and Drug Act 1906 / Meat Inspection Act
- Agricultural / Meat Products - FSIS Food Safety Inspection Service
- Organic (Natural Organic Products)
- Certified Organic versus Organic Compliance
- Natural labeling

### **Food and Drug Administration (FDA) – Examples:**

- CFR Title 21
- Food Sanitation Act
- Food Additives Amendment 1958
- Nutritional Labeling and Education Act 1990
- Dietary Supplement Health and Education Act 1994 Nutraceuticals (Orphan Drug Act)
- Food Safety Modernization Act (FSMA) 2011
- Food Allergen Research and Resource Program (FARRP)
- Specifications
- Certificate of Analysis
- Natural Certification / Continuing Letter of Guarantee
- Food Grade
- Good Manufacturing Practices (GMP's)

### **Flavor and Extract Manufacturers Association (FEMA) – Examples:**

- Consumption Ratio
- Expert Panel
- GRAS Lists

### **Certifications – Examples:**

- American Institute of Baking Certification (AIB)
- British Retail Consortium (BRC)
- Food Safety System Certification (FSSC)
- Global Food Safety Initiative (GFSI)
- ISO 9000 Safe Quality Food (SQF)
- Special Audit Programs (Siliker, etc.)



**Foreign Regulatory Issues – Examples:**

Japan - Ministry of Health, Labor and Welfare and the Food Sanitation Act  
Joint Expert Committee of Food Additives (JECFA)  
European Food Safety Authority (EFSA)  
United Nations (UN)/ World Health Organization (WHO)  
Hazard Analysis and Critical Control Points (HACCP)  
Codex Alimentarius (CA)  
Global Harmonization System (GHS)  
International Organization of the Flavor Industry (IOFI)

**Department of Transportation (DOT) – Examples:**

CFR Title 49  
Flash Point  
HAZMAT - Hazardous Material Identification (HMIS)

**Department of Justice - Drug Enforcement Administration (DEA) – Examples:**

CFR Title 28  
Chemical Diversion and Trafficking Act

**Dietary Considerations – Examples:**

Kosher: Pareve, Dairy, Meat, Passover  
Halal  
Vegan  
Gluten Free

**Federal Trade Commission – (FTC) – Examples:**

CFR Title 16 – Labeling

**Occupational Safety and Health Administration – (OSHA) – Examples:**

CFR Title 29  
Safety Data Sheets (SDS)  
HAZCOM 2012 - Hazardous Material Identification (HMIS)  
Danger versus Warning

