THE SOCIETY OF FLAVOR CHEMISTS SYLLABUS

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 enquiries 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 Committee 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

SFC Candidate for Membership Interview Process (cont'd)

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. The Membership Chair can be contacted at membership@flavorchemist.org should additional information be needed.**

Commitment to 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 enquiries.
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
14. Industry periodicals including:

- Perfumer & Flavorist
- Journal of Agricultural & 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

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
Aldehydes
Ketones
Lactones
Phenols
Sulfur Compounds
Sesquiterpenes
Chemosensory Ingredient
Alcohols
Esters
Macrocyclic compounds
Nitrogen compounds
Furans
Terpenes
Isomers: cis & trans; dextro & laevo

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
Deaminazation
Interaction
Metalo-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:

Refractometer Refractive Index/Brix
Density Meter/Densitometer
pH Meter
Flash Point Tester
Karl Fischer Titration or Moisture Analyzer
Spectrophotometer/Colorimeter
Water Activity Meter
Gas Chromatograph / Mass Spectrometry

Secondary:

Turbidity Meter	Flame Ionization Detector
FTIR Spectroscopy	Viscometer
Particle Size Analysis	Liquid Chromotography

II. CATEGORIES OF FLAVORING SUBSTANCES

Explain physical form, method of production and solubility of:

Absolutes
Concentrates (Ex. Fruit Juices)
Concretes
Distillates: fruit, cocoa, coffee
Enzymatic Modified Cheeses
Essential Oils (Expressed and Distilled)
Extracts (Tinctures and Vanilla)
Oleoresins (Resinoids)
Citrus products

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

Almond	Anise
Basil	Bergamot
Black Pepper Oleoresin	Bois de Rose
Capsicum	Caraway
Cassia	Celery
Cinnamon: bark and leaf	Clove
Coriander	Cumin
Dill	Eucalyptus
Garlic	Horseradish
Lavender	Lemon
Mustard	Neroli Bigarade
Onion	Orange
Orris	Peppermint
Spearmint	Thyme
Wintergreen	

III. FLAVOR LABELING

FDA Flavor Declaration

Artificial	Natural
Natural Flavor Type	Natural WONF
Natural & Artificial	

USDA Labeling

USDA Organic/Natural requirements	Canada Amenability requirements

TTB Labeling

Limited Ingredient items 0.1% Artificial Topnote

Standard of Identity

Vanilla, etc. define and give examples

Genetically Engineered Ingredients/Genetically Modified Organisms (GMO)

Allergens

United States
Canada
European Union

IV. NON-FLAVOR INGREDIENTS

Solvents

Types: Water soluble, Oil soluble
Appropriate uses in flavor design and application
Discuss advantages/disadvantages of each, such as shelf life stability.

Acidulants and Buffers

Carriers

Gums Salts
Carbohydrates Sugars
Protein

Colors

FD&C, Lakes, Caramel, Naturally Derived

Preservatives / Antioxidants

Antimicrobial Antioxidant

V. FLAVOR FORMS

Describe processing procedures

Liquid: Water soluble
Oil Soluble
Emulsions

Dry: Drum Dry, Fluid Bed Drying, and Other Dehydration Methods
Plating
Spray Drying

Pastes: 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	Brown Flavors
Dairy Flavors	Mints
Savory Meat/Seafood	Savory Vegetable

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	Creamy
Fresh	Brown
Juicy	Sweet
Meaty	Tropical

VII. REGULATORY 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	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)
Food Safety System Certification (FSSC)
ISO 9000
Special Audit Programs (Siliker, etc.)
British Retail Consortium (BRC)
Global Food Safety Initiative (GFSI)
Safe Quality Food (SQF)

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 Certification: 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