Abaisse – A sheet of rolled out pastry.
A’ blanc – Food that is cooked or partially cooked, but not browned.

Abbreviations and Acronyms – See Appendix 1.

Absinthe – An alcoholic beverage made from wormwood, having a characteristically astringent bitter flavor. Thujone, the active narcotic ingredient present in this beverage, was found to be responsible for toxic side effects. Upon this discovery, France banned the drink in 1915. See Artemesia – Wormwood, Bitter.

Absolute – The alcoholic extract of a concrete, otherwise known as the absolute d’concrete. A concrete is the oil base extractive of a botanical, usually a floral, a herb, or a spice. Due to the cost of most absolutes, they usually are used at lower levels in flavors. Absolutes, therefore, are found in formulations where they lend themselves to fine nuances and backgrounds. It is also typical that these characteristics are not characterizing, but which contribute a differential nuance to the flavor blend. For listing, see under individual botanical listings. See Concrete, Extraction, Extract, Extrait, Extractant, Differential Ingredients.

Absolute Oil – The subsequent steam distillation of the essential oil from an absolute. See Essential Oil, Absolute, Concrete.

Absolute Zero – The lowest temperature possible, equivalent to 273 degrees below 0°C.

Absorption – Absorption is the process describing either:
1. A liquid or a solid taking in a gas in the form of aromas, or
2. A substance taking up energy in the form of heat, light, or X-rays. See Adsorption.

Acacia Gum – See Arabic Gum.

Acai (Euterpe Oleracea) – The Acai Palm is a tall and slender plant whose clusters of new leaves are eaten as hearts of palm. This is also called the cabbage of the plant. It produces a very dark edible berry high in essential fatty acids (omega 3, 6, and 9 fatty acids) as well as high concentrations of anthocyanin, a phytochemical found in other dark berries that have antioxidant properties. It grows mainly in South America. The acai palm is related to Euterpe edulis juçara known for hearts of palm. Purported high levels of anthocyanins considered good for promoting health benefits as an antioxidant and is usually on the top ten list when people ask for a grouping of ‘superfruits’. See Chart 496 Acai, Superfruits. See LDL, Anthocyanins, Phytochemical, Palm, and Appendix 2 – Nutraceuticals Overview.

Acaricide – A chemical that kills or controls mites or ticks. See Herbicide, Pesticide.


Accelerated Storage Conditions – Conditions such as moisture, temperature, light (usually ultraviolet), and atmosphere (usually oxygen) have a tendency to decrease the shelf life of a product. Accelerated storage conditions are designed to enhance, accelerate, and simulate changes that will occur at ambient conditions over a longer period of time. See Accelerated Storage Stability Testing, Ambient Conditions, Shelf Life.

Accelerated Storage Stability Testing – A method by which a product is exposed to elevated temperatures simulating what would happen over longer periods on the shelf. This technique is usually conducted at ambient temperatures and conditions.
Increased temperatures accelerate those chemical reactions which occur normally at lower rates at lower temperatures. A rule of thumb is for every increase in temperature of 10 °C, the reaction rate doubles. There are some exceptions to this rule, however, and reaction dynamics are not always linear. For example, some reactions do not take place until a certain threshold reaction temperature is reached. (Below this temperature, the action rate is insignificant.) Some general guidelines have been established as follows: A product kept 4 months at 100 °F is equivalent to 6 months at 70 °F. See Attribute Tests, Storage Stability, Shelf Life.

Acceptance – A sensory term meaning the approval of or positive attitude toward a food or flavor or the state of being whereupon a substance is described as being within expected or desired parameters within a specified range. Acceptance can also be directly proportional to a rating on a Hedonic Scale, Attribute, Sensory Evaluation.

Acceptance Number – Otherwise designated as the C factor, relating to the number of ‘out-of-specification’ data versus the ‘within specification’ data in a given study. See Sensory Evaluation.

Acceptance Quality Level – See AQL.

Accord – When two or more flavor substances are so finely balanced that they take on an aroma character unlike either of the individual substances. An example is a blend of citrus and spices with brown notes blended in such a way as to be reminiscent of a cola beverage. See Balance.

Acerola (Malpighia punicifolia L.) or Barbados Cherry and Wild Crapemyrtle – See Appendix 2.

Acetaldehyde – The second simplest of aliphatic aldehydes (formaldehyde, of course is the simplest) that is found in many natural flavor systems. Due to its extreme volatility, it is often an important, yet fleeting contributor toward the top note of many products, including the fresh juicy character of orange juice and other citrus juices, as well as many other fruits and vegetables. For this reason, a patented spray-dried form is used in a popular orange-type powdered drink mix. Acetaldehyde has been shown to have adverse feeding study data, and California has regulated its use it that state according to Proposition 65. See Aldehydes Aliphatic, Keto Aldehydes, and Cyclic Aldehydes; Juicy, Freshness.

Acetals – Formed through the action of aldehydes and alcohols. Because solvents such as glycerine, alcohol, and propylene glycol contain a hydroxyl moiety, and as these solvents are used in most flavors, acetals are formed upon standing with most flavor systems. Acetals have very limited flavor use per se, as most acetals have little or no odor due to their higher molecular weight. Often acetals have off flavor like the floral character of benzaldehyde P.G. acetal, or the harsh flavor of valeraldehyde P.G. acetal. Acetals revert in slightly acid pH aqueous systems, so in most cases, when used in a final food product like an acidified food or beverage, acetals will revert back to the starting aldehyde. It is likely that the inclusion of acetals on the GRAS lists is not necessarily for their flavor characteristics, as they are not generally useful as such. However, the inclusion of chemicals and their acetals onto the GRAS list was more likely done preemptively. As a flavor sits, many reactions occur. Acetal formation is just one of these. At the time, a few companies’ regulatory departments felt that all of the myriad of acetals might have to be accounted for. As this line of thinking went on, many began to realize that an insurmountable task was at hand. When we age wine, do we need to consider all of the reactions that went into the aging process? The answer is obvious. This expanded concept has never come to fruition. See Glycerine, Propylene Glycol and Derivatives, Valeraldehyde, Benzaldehyde, Aqueous, Harsh, Floral, Beverage, Acid, Hydroxyl, Alcohol, Moiety, Dioxolanes, Dioxanes (Glyceryl Acetals), Hemiacetals, Ketals, Chart 2 – Acetals, and Figure 1.

### Acetals

Acetals are a group of compounds formed when aldehydes are linked to alcohols after the removal of water.

![Fig 1a - Acetaldehyde plus Ethanol yields Acetaldehyde diethyl acetal.](image)

![Fig 1b - Alternate ways to designate the same formula.](image)

**Figure 1**
Acetic – The olfactory property in which a substance is reminiscent of acetic acid. See Descriptive Terminology, Acid, Fatty Acids.

Acetic Acid – The volatile acid that is reminiscent of and the active ingredient of vinegar. It occurs in lower levels as a by-product of fermentation. Acetic acid is found in cheese products, other dairy systems, ripened fruits, and many other natural flavor systems. Acetic acid is formed from the oxidation of the alcohol contained in spirits. Microorganisms such as Acetobacteria aceti are ones that could be responsible for this change. Before these microorganisms were identified, it was thought that the turning of alcohol to vinegar was due to contamination by a fly subsequently named a vinegar fly. Acetic acid is a classic example of an aroma compound that also affects a taste (by lowering the pH and adding a sour character). See Oxidation, Vinegar, Fermentation, Partitioning.

Acetoacetates – Chart 3 – Acetoacetates are compound ketone-containing esters. Some of them occur in nature (ethyl acetoacetate in baked products). They may have questionable stability in a finished flavor and have been observed to give off carbon dioxide upon standing in acidic conditions. See Ketones (Aliphatic), Stability, Keto and Hydroxy Esters, and Chart 3 – Acetoacetates.

Acetoin Acetyl Methyl Carbinol – Although many claim it has a faint aroma and taste, it seems more likely that trace quantities of oxidized diacetyl are responsible for its apparent odor characteristics. It seems to have more of an effect on the trigeminal and taste receptors than the olfactory senses. See Oxidation, Reduction, Diacetyl, Butter, Buttery, Ketones (Aliphatic).

Acetyl Propionyl – A chemical which has been reported by RIFM not to have the same biological effect and transference into the bronchioles as diacetyl, but nonetheless has been linked together with diacetyl by the government as a potential cause of bronchiolitis obliterans. See Diacetyl, Bronchiolitis Obliterans, Popcorn Lung.

ACF – Quote from the website: The American Culinary Federation, Inc. (ACF) is the premier professional chefs’ organization in North America, with more than 240 chapters nationwide and 18,000 members. ACF offers culinarians of all ages, skill levels, and specialties the opportunity to further their careers, as well as enhance their lives.

Achene – The yellow seeds of a strawberry fruit or the seedy fruits inside a fig receptacle.

Achillea – See Yarrow Herb.

Achilleic Acid – See Acidulant(s), Aconitic Acid.

Acid –

1. In flavors, the nonvolatile acids that are important are those GRAS substances that affect the pH of a food product, and can be therefore tasted via taste buds located on the tongue.

2. In flavors, the organic acids, some of which can have both appreciable vapor pressure and aroma type, so as to be perceived as an aroma can have the above effect on pH as to be both tasted and smelt (acetic acid, propionic acid, butyric acid). Therefore, it is important to distinguish between the aroma called acidic aroma and the taste called the acid or sour taste. Acid aromas range from pungent to cheesy to waxy. Some of the higher molecular weight branch chained isomers tend to be gamey and meaty. See Acetic Acid; Butyric Acid; Pungent; Taste; Aroma; Sour; Branched Chain Molecule; Gamey; Meaty; Acids, Chart 4 – Acids All Types, Chart 5 – Acids Unsaturated Aliphatic, Chart 6 – Acidulants.

Acid Hydrolysis – The process of breaking down of more complex, usually water-insoluble substances, like proteins, into simpler, more water-soluble components like amino acids. Acid hydrolyzed proteinaceous substances, commonly called HVPs contribute taste enhancement, as well as trace aroma components. HVPs are usually used in savory-type applications. Acid hydrolyzed products can also be used as sources for amino acids combined with reducing sugars as ingredients to be used in a Maillard Reaction. See Hydrolyzed Plant Protein, Autolysis, Autolyzed Yeast, Tastant, Taste, Maillard Reaction, Reducing Sugar, Non-Enzymatic Browning, Enzymatic Browning, Enzyme Hydrolysis.

Acidified Foods – An acidified food is one where the pH is reduced for the purpose of enhanced microbial stability and shelf life. To prevent the growth of harmful bacteria, such as Clostridium botulinum and other pathogenic organisms, foods may have acid added to them to a final equilibrium pH level of 4.6 or lower. It is also recommended that the water activity of the food system be greater than 0.85 for the acidification to be most effective. Acidification of dairy products can denature or granulate the milk proteins and therefore, one would need to add phosphates to help retard this effect. Disodium phosphate, tetra sodium phosphate, and sodium hexa meta phosphate seem to work best in this regard. Flavor changes can also occur at low pH, and both the effect on flavor and the pH effect on the base product that in turn can affect the flavor becomes a synergy, which must be addressed in these types of products. See pH, Acidity, Microbiological Stability, Processing, Processing Conditions, Production Issues.
Acidity –
1. The quantity of hydronium ions.
2. The lowness of the pH (less than 7.0).
3. The sharpness on the tongue as perceived by the taste buds that are sensitive to pH.
4. The overall acid character of a flavor profile.
5. The sourness of a flavor. The degree acidity is the amount of pH units below a pH of 7.0, or neutrality.
6. In wine, an essential characteristic.

The proper balance of acidity and sweetness usually makes for a mouth-watering flavor profile. See pH, Acid, Acidulant(s).

**Acidophilic Microorganisms** – Microorganisms that grow well in acid conditions. See Microbiology.

**Acidophilus bacterium** – See Starter Cultures.

**Acidophilus Milk** – Milk fermented by the Lactobacillus.

**Acidulant(s)** – Acidulants are flavor compounds that contribute to taste only and do not have any aroma. Therefore, citric acid is an acidulant; acetic acid is not, even though the addition of either one in a food system will affect a downward result (more acid) on the pH. See Acids, Chart 6 – Acidulants.

**Aciduric** – A description of the types of organisms that can grow in high acid foods. This is synonymous with acidophilic. See Microbiology.

**Acitrónes** – Candied prickly pear cactus leaves (Mexican).

**Aconitates** – Esters of the singly unsaturated version of glycerine (Propenetriol). See Glyceryl Esters.

**Aconitic Acid** – See Acidulant(s).

**Acid** – A characteristic both biting and stinging to the mucosa (an effect on the trigeminal and touch sensing nerves) as well as an unpleasant acidic, pungent odor. Acridity is usually a negative attribute. See Trigeminal Nerves.

**Acrylamide** – Formed from the reaction of sugars and amino acids (Maillard Reaction). Acrylamide has been found to be a carcinogen at higher levels as well as a compound that could do damage to the nervous system. Recent studies such as the one conducted at University Public Health Schools show that the cancer correlation cannot be confirmed. However, because acrylamide is a genotoxic or DNA damaging chemical, future indications are less clear cut. See Maillard Reaction, Carcinogen, Genotoxin.

**Acute Oxygen Method** – See AOM.

**Acuity** – The degree of sensitivity. Flavor, taste, or organoleptic acuity means the degree a person can perceive those corresponding sensations. See Supertasters, Taste, Tongue, Olfaction, Sensation.

**Acetyl** – The term for the fatty acid portion of an ester. Example: Ethyl laurate is ethyl alcohol and lauric (dodecanoic) acid. The fatty acid portion or acyl group is lauric acid. See IUPAC, Aryl, Fatty Acids, and Chart 146 – Alkyl Esters – Grouped by Alcohol Moiety, Alkyl Esters, Grouped by Alcohol Moiety.

**Adaptation** – The decrease in the sensitivity to change due to continued exposure to sensory stimuli. Also known as fatigue, saturation, and satiation. See Saturated (Satiated).

**Adaptogen** – A term first described by mid-twentieth century by the Soviet scientist Nicolai Lazarev. An adaptogen is a substance that maintains health by increasing the body’s ability to adapt to environmental and to internal stress. By definition, an adaptogen causes no side effects and can treat a wide variety of illnesses. An adaptogen helps an organism come into balance or homeostasis, despite the reason for the imbalance. See Nutraceuticals.

**Addiction** – An excess craving for something. It has been said that flavor make food addictive. This is preposterous. Flavors make food processed for safety whose flavor is lost or depreciated much more palatable, enjoyable and therefore beneficial. See Aversion.

**Additives (Food Additives)** – Substances that are added to foods for their improved benefit, be it flavor, shelf life, texture improvement, color, or other improvements to the physical, chemical, or sensory attributes. See Regulations.

**Adenosine** – Adenosine monophosphate, monosodium, or disodium adenylate – A nutraceutical that has been studied for its use in healing wounds, its treatment of diabetes mellitus, and its ability to lessen the effects of some instances of tachycardia (rapid heart racing, whose long lasting severity can cause death). It is a nucleotide found in RNA. Linguagen Corp. has patented its use as a bitter blocker. See Appendix 2 – Nutraceuticals Overview and Chart 29 – Amino Acids.

**Adhesion Starch** – A modified food starch, which allows a batter to stick more efficiently to a food. See Batter, Standard Breading Procedure.

**Adjuvant** – An ingredient that affects the food product and/or aids in the perception of the flavor. These are the non-flavoring ingredients that are also non-foods. See Regulations, Code of Federal Regulations.

**Acidity – Adjuvant**
Adsorption – The action of taking up of a gas by a liquid or by a solid, or the taking up of energy (heat, light, or X-rays) on the surface of a food. See Absorption.

Aduki Bean – See Adzuki Bean.

Adulteration –
1. The criminal offense of adding a non-food grade product to a food-grade product.
2. The illegal addition of a synthetic flavor and calling it a natural flavor.
3. The illegal and generally unethical practice of adding non-indigenous ingredients to another product, and not declaring the addition. Note: This is especially true with adulteration of essential oils, where the final product is still declared as natural, and should not be under our regulations. Example: The addition of trace amounts of synthetic citral to a field distillation of lemon oil to boost the natural citral content of the oil, and not declaring the citral. Unfortunately, some crop reports available indicate some natural products’ available world or regional supply far exceeds the expected source potential. It is suspected that essential oils of this nature are extended by use of clever techniques, like adulteration. Unfortunately, it is very difficult to isolate these instances and prove that this is occurring, especially when the oil or other so-called natural product has passed through many hands, and the original source might be a Third World country whose fields might be difficult to access. One newer development is the analysis by isotopic abundance. Lately some very interesting research has also been done on chiral configuration. There are some problems concerning this method, including cost of analysis and sample size. The best way to avoid overpaying for what should be a legitimate product, but is not, is to know your supplier very well, and do gas chromatographic analyses and organoleptic evaluations from time to time, comparing with other sources, and also to check your gas chromatographic breakdowns with those found in the literature.

See Natural (Flavors); Artificial, Synthetic, or Not Natural; Sophistication; Cut (Cutting); Coupage; Isotopic Analysis (Isotopic Ratio); Carbon 13; Carbon 14; Half-Life; Chirality; Optical Rotation.

Adverse Event Reporting System – AERS – As cited in one report by the Food and Drug Administration, “The Adverse Event Reporting System (AERS) is a computerized information database designed to support the FDA’s post-marketing safety surveillance program for all approved drug and therapeutic biologic products. The ultimate goal of AERS is to improve the public health by providing the best available tools for storing and analyzing safety reports.’ It goes on further to say: ‘The reports in AERS are evaluated by clinical reviewers in the Center for Drug Evaluation and Research (CDER) and the Center for Biologics Evaluation and Research (CBER) to detect safety signals and – to monitor drug safety. They form the basis for further epidemiological studies when appropriate. As a result, the FDA may take regulatory actions to improve product safety and protect the public health, such as updating a product’s labeling information, sending out a “Dear Health Care Professional” letter, or re-evaluating an approval decision.’ See FDA, Food Safety, Reportable Food Registry.

Adzuki Bean (Phaseolus angularis or Vigna angularis) – Also called aduki bean. Ranks second in importance to the soybean. Usually brown with a long white hilum, but comes in other colors like pale yellow, gray, green, or black. In China the bean is considered to bring good luck. Recently a popular food for macrobiotic diets as a good source of needed essential amino acids. See Legumes, Beans, Broad Bean, Buck Bean.

AEDA – Aroma Extract Dilution Analysis. The process of diluting the flavorant until the odorant is no longer perceptible. See Charm Analysis.

Aerating Agents – See Foaming Agents.

Aeration – The addition usually by beating, bubbling, or high speed mixing of air into a product. See Foam, Foaming Agents.

Aerobic – An adjective meaning in the presence of air.

Aerobic Organisms – AO, Otherwise called aerobes, these are organisms that thrive only in the presence of air. See Anaerobic Organisms.

AERS – See Adverse Effect Reporting System

AFA or aphanizomenon flos aquae – See Appendix 2 – Nutraceuticals Overview.

AFC – See Alternate Forced Choice, Sensory Evaluation.

Affective (Methods) – Sensory methods that are either qualitative or quantitative analyses done by consumers as opposed to analytical methods that are discrimination or descriptive panels of trained or semi-trained panelists. See Sensory Evaluation, Consumer Testing.

Aflatoxin – Organic substance(s) that are generated by molds such as Aspergillus flavus or A. parasiticus. Typically, they are found as contaminants in food products such as peanut, grains, etc. Aflatoxin has been seen to be a potent carcinogen and has been extensively studied in that regard. See Pathogenic (Pathological) Organisms.

Agar (Agar Agar) – A seaweed-based gelatinous colloid that is used as a thickener or stabilizer for food systems. Nutrient agar is an agar blend where nutrients are added to agar to provide an environment that accelerates microbial growth for the purpose of
bacterial testing in a petri dish. See Microbiological Assay, Nutrient Agar, Petri Dish.

**Agaricus Blazei Murrell or Hime-Matsutake Mushroom** – See Appendix 2 – Nutraceuticals Overview.

**Ageusia** – Lack or impairment of the sense of taste. See Agustia.

**Agglomeration** – The forming of a larger mass by causing a substance like a liquid to combine with another ingredient like a powder. Agglomeration is used for many reasons, such as instantization, particulate formation, bulk density adjustment, physical appearance, etc. See Spray Drying, Dehydration, Hygroscopic or Hygroscopicity.

**Aging** –
1. The process of mellowing over a period of time. The aging of wine, mints, and cheese means the process of continually reacting ingredients, which lead to a more complex number of flavoring materials lending to a more rounded profile. These reactions can include enzymatic reactions, oxidations, Schiff base formation, transesterification, rancidification, Maillard Reaction, interesterification, polymerization, saponification, etc.
2. The simulation of the aging process on the shelf (in the stores, refrigerator, etc.) so as to predict the changes developing upon storage.
3. The process of maturation of a person. This is a complex system that is currently being researched. There is a disease where the aging process is accelerated. This rare disease is called progeria. It is postulated that if a condition or circumstances can accelerate the aging process there might be other conditions or circumstances that can decelerate the process as well. Some believe that telomeres, a region of repetitive nucleotide sequences at each end of a chromatid have also to do with the aging process. See Transesterification; Enzymes; Schiff Base; Rancidification; Interesterification; Polymer, Polymerization; Saponification, Accelerated Shelf-Life Testing, Oxidation, Senescence, Ripening, Chromatid, Chromosomes, DNA, Oak Barrel Aging.

**Agitating Cookers** – Retorts or other cooking machinery that provide a mixing or agitation during the cooking process.

**Aglycone** – The chemical tied up in a glycoside. The chemical expressed usually through enzymatic reaction of a glycosidase on a glycoside. The glycoside amygdalin has amygdalase breakdown products of glucose, cyanide, and benzaldehyde. See Enzymes; Almond, Bitter; Benzaldehyde, Amygdalin.

**Agropyrum** – See Dog Grass.

**Agustia** – The inability to discern taste components via the taste buds of the tongue. There is a condition known as partial agustia wherein the ability to taste is either significantly reduced in intensity or absent for certain ingredients. See Anosmia, Gustation, Olfaction, Temporary Agustia.

**AIB Food Safety Audits** – Established in 1919, the American Institute of Baking has conducted training and audit based certification for many years. Although it is not necessarily recognized by the GFSI protocols of the United Nations perhaps because it is made up of the individual companies it is meant to audit, it is an audit protocol used by many companies in the United States in response to the Food Safety Modernization Act (FSMA). See FSMA, GFSI, UN, Third Party Audits.

**Aioli** – A garlic flavored mayonnaise. Similar to a Rouille without the coloring. See Rouille, Culinary Arts.

**Ajowan** – It is arelative of the caraway and cumin plants. The essential oil contains thymol. The botanical is also called ajwain, bishop’s weed, omam, and omum. See Caraway, Cumin.

**A La** – A French phrase used often in recipes, which means a food is cooked in a certain style or manner. See Culinary Arts.

**A La King** – A cooked chicken dish with mushrooms, bell peppers, which is cooked in a velouté sauce. See Culinary Arts.

**A La Minute** – A culinary term literally meaning ‘in a minute’ and more broadly meaning the dishes cooked to order rather than for production, shipping, distribution, and storage in the food processing industry. Describing the on the spot cooking style used in restaurants. It is the a la minute style that provides for the use of fresh herbs and the finest of flavors.

**A La Minute versus Industrial Scale Production** – When translating the a la minute developed ‘Gold Standard’ to a practical form for industrial production, many compromises need to be taken into account, such as:
1. Availability of the product – Example: fresh herbs and spices are not available in industrial settings. IQF (Instantly Quick Frozen) items can suffice, but they bring other attributes as well. Very large volume companies might use a product that is just not enough in the world to provide.
2. Cost – Costly items can be absorbed in a menu setting at a restaurant but oftentimes contribute too high a raw material cost in an industrial environment.
3. Quality – Some items are just not available in the finest grades in larger quantities.
4. Processing Changes – As the food undergoes changes during the processing – necessary for microbiological stability and product safety – many component food characteristics can be altered often resulting in less than a Gold
Standard Profile. One issue is the lowered boiling point in higher altitudes. Temperatures might not be reached to fully cook starches or reach food safety temperatures adequately.

5. Processing Requirements – For example, the pH must be lowered in a canning environment in order to assure for protection against clostridium botulinum. Hot packing also needs lower pHs and can curdle cheese and other proteins. Pump pressures must be developed, therefore gums or other thickeners need to be used to build up pump pressures. This often affects flavor quality.

6. Technique Inappropriateness – The development of a roux, often used to thicken in culinary applications, is infeasible in large-scale production.

7. Marketing Position – The position of the product, be it low fat, organic, or other type of claim might make the source of ingredients difficult, if not impossible, to find. Use of salt replacers; fat mimetics; starches, gums, or other thickeners can affect flavor release and mouthfeel and often introduces off characters and undesirable flavor characters of their own. Marketing considerations might also include religious consideration such as Halal and Kosher. Nutrient additives can also introduce undesirable characteristics.

8. Storage and Shipping – Shipping, storage, and packaging might also have a significant effect on the product’s quality. Hot climate can degrade quality significantly. Using antioxidants, preservatives, and other similar additives can affect flavor quality.

A La Mode – Similar to the simpler phrase ‘a la,’ but in a special way as in pie a la mode, meaning with ice cream on top. See Culinary Arts.

Albedo – Whiteness, referring to the inside pulpy layer of the citrus rind, which contains alkaloids such as naringin, which is a bittering principle. See Flavedo.

Albumen – The white portion of the egg, which contains albumin. See Albumin.

Albumin – A protein, which is soluble in salt-free water at a pH of 7. Most albumins come from animal products. Plants usually contain less than 1% albumins. Albumins also include glucoproteins. Egg albumin, which is found in the white portion of the egg, otherwise known as the albumen. Albumen, for example contains 2 moles of glucosamine and 4 moles of mannose. Albumin is synthesized by the liver using proteins that we consume. Its presence in blood plasma creates a cellular pressure (osmotic force) that helps develop a cellular equilibrium. Albumin, therefore, is a good indicator of health. A low albumin level in a blood test is a sign of poor health. See Protein, Globulin.

Alcohol – Also known as ethyl alcohol as is commonly used. See Solvent.

Alcoholic Beverages – Drinks, drink mixes, and related products that are produced using ethyl alcohol for the purposes of intoxication. These products include dry bar mixes, cordials, wines, beer(s), spirits, distilled spirits (hard liquor), liqueurs, and wine coolers and many more. It does not include products that albeit contain appreciable amounts of alcohol and are not purchased for the express purpose of intoxication including medicinal preparations, mouthwashes, or similar items. See Alcohol, TTB, Limited Use Ingredients.

Alcohol Industry – The Beverage Industry segment that produces alcoholic beverages. See Alcoholic Beverages, TTB.

Alcohols (Saturated) – A group of chemicals that correspond to the presence of a hydroxyl group (hydrogen plus oxygen). When the hydroxyl group is associated with a benzyl group (aromatic compound), it is a phenol. When it is a non-aromatic compound, it is an aliphatic alcohol. Simple phenols are associated with burned, tar-like, and oxidized odors; complex phenolic compounds like vanillin tend to be sweet, warm, and brown. It is important to note that the lower molecular weight alcohols are used as solvent in flavors. See Hydroxyl, Benzyl Esters, Phenol, Aromatic, Aliphatic, Tar-like, Tarry; Burnt or Burned, Vanillin, Warm, Brown, Glycerides, Terpenes – Oxygenated and Other Related Compounds, Chart 7 – Alcohols – Aliphatic Alcohols, and Chart 8 – Alcohols – Aliphatic Cyclic Alcohols. See also Figure 2 and Figure 3.

Alcohols (Aliphatic Cyclic) – These compounds can have a saturated or non-aromatic cyclic structure. Compounds that have at least one double bond in the ring structure are listed here. These compounds could also fall into the class of terpene alcohols. See Chart 8 – Alcohols – Aliphatic Cyclic Alcohols.

Alcohols (Aromatic) – A complex group of compounds that includes simple phenols having a tar-like aroma and taste. Eugenol is the characteristic clove flavorant. Vanillin is chemically a combination of an ether, aldehyde, and alcohol. It has the aroma of vanilla, is used in the standard of identity of chocolate, and is widely used in most of the sweet flavor types for its ability to round out the profile, and reduce harsh notes. Phenyl ethanol, and its esters, range from floral to honey like. See Phenol; Eugenol; Clove; Vanillin; Chocolate; Harsh; Esters (Aliphatic) and Ester Chart; Honey; Floral; Ethers; Aldehyde; Alcohol; Alcohols (Unsaturated, Aromatic) Chart 10 – Alcohols – Unsaturated Non-Aromatic, Chart 13 – Aldehydes Aliphatic & Keto Aldehydes & Cyclic Ald, Chart 146 – Alkyl Esters Grouped by Alcohol Moiety.
**Alcohols (Unsaturated, Non-Aromatic)** – Aliphatic alcohols with one or more double- or triple-bond sites often possess varying degrees of green flavor. One of the most popular is cis 3 hexenol or leaf alcohol. Compounds with a trans unsaturation are usually harsher than their cis counterparts. Double bonds are usually less pungent than triple bonds, and multiple bonding increases the strength and pungency as well. An example of increased pungency would be cis 3 hexenol, trans 2 hexenal, hexadienol, and hexadienal. The sterically hindered cis forms are usually chemically more instable than their trans counterparts with more molecular room to breathe. An example of the conversion from cis to trans isomerism is found in fresh tomato juice, which has a prevalence of the cis hexenol that changes form through the cooking into tomato sauce (which then has a higher ratio of trans hexenal). Triple-bonded alcohols like methyl heptine carbonate are very green and have a watermelon rind-like character. Unsaturated cyclic compounds like cycloalkenes, etc., are also included here, as are hydroxy furanones and heterocyclic compounds with the enol group. However, this class of compounds tends not to be green but is quite brown, nutty, and roasted in flavor profile. See Aliphatic; Double Bond; Triple Bond; Alcohol; Cis (Isomerism); Trans (Isomerism); Isomer; Dienal; Dienol; Steric Hindrance; Ionones, Methyl Ionones, Irones, Pseudo Ionones, and Ionols; and Chart 10 – Alcohols – Unsaturated Non-Aromatic.

**Alcohols (Unsaturated, Aromatic)** – These compounds have a benzene structure and also an unsaturated side group. They possess a varied odor profile from resinous or floral, to vanillic (propenyl guaethol) and pungent/phenolic.

**Aldehydes (Aliphatic, Keto Aldehydes, and Cyclic Aldehydes)** – A group of chemicals that corresponds to the presence of a terminal carbonyl group. (C=O) Aldehydes are generally stronger and harsher than their corresponding alcohol counterpart. Example: Hexanal is harsher and stronger than hexanol.
When there is a presence of a double bond, the difference is usually exaggerated, and when there are two or more double bonds, as in the case of dienals, the differences are compounded further still. As with most of the esters, these compounds show a similarity of flavor profile within carbon number. Therefore, butyl butenal is similar to octenal. From one double bond to an aldehyde dienal counterpart, the flavor attribute within the same carbon number is roughly similar, although a lot stronger in the two double bond counterparts. See Chart 16 – Alfalfa.

Aldehydes (Aromatic) – Aromatic aldehydes generally range from harsh and pungent to sweet and heavy. Some of the better-known aromatic aldehydes are benzaldehyde, the almond/cherry compound, vanillin, ethyl vanillin, and heliotropine. Benzaldehyde is used in cherry-type cough drops, and is useful in many fruit flavors as a sweet berry note, and the last three being commonly used in flavors for their contribution to the warm sweet background of a flavor profile. Profiles are extremely variable in character and intensity. Specific flavor identity for these compounds has more to do with other structures present and less to the fact that they are aromatic aldehydes. The aldehyde heliotropine (aka piperonal or methylene dioxy benzaldehyde), which is found in nature, including vanilla extract, yields a sweet cloying vanilla note and can be used in vanilla flavors and many other flavors for its sweet sugary contribution. See Vanillin, Ethyl Vanillin, Benzaldehyde, Harsh, Pungent, Sweet, Heavy, Aromatic, Aldehyde, Fruit, Berry (Like), Background, Top Note, Middle Ground, Flavor Profile, Intensity, Structure, Heliotropine, Piperonal (Heliotropine), Vanilla (Extract), Sugary, and Chart 15 – Aromatic Aldehydes.

Aldehydes (So-called) – When aroma chemicals were first being researched and identified, it was erroneously thought that the aldehydes were the main aroma compounds, that is, citral, decanal, benzaldehyde, heliotropine (piperonal), octanal, acetaldehyde, tolyl aldehyde, vanillin (hydroxy methoxy benzaldehyde), etc. In fact, in 1899, over 20 aldehydes were either found or used in food products. Some are no longer approved for use in foods. For example, Aldehydes C-7 and C-8 were derived from castor oil at this time for use in flavors. The abundance in flavor-characterizing compounds falling into the chemical aldehyde category leads to the false conclusion that all aroma compounds should fall into this category. The advent of modern structural chemistry of course proves that concept to be mistaken. See Dienal, Alcohol, Pungent, Unsaturated (Bond), Double Bond, Comparative Flavor Chemistry, Esters, Fatty/Green. These chemicals are listed in Chart 12 – So-called Aldehydes.

Aldehydes (Unsaturated Alkenals, Alkadienals, Alkynals, and Cyclic Non-Aromatic Aldehydes) – As with most of the alkyl esters, these compounds show a similarity of flavor profile within carbon number. Therefore, butyl butenal is similar to octenal. From one double bond to an aldehyde dienal counterpart, the flavor attribute within the same carbon number is roughly similar, although a lot stronger in the two double bond counterparts. See Esters, Green, Fatty/Green, and Chart 11 – Alcohols – Aromatic and Unsaturated.

Aldehydic – Reminiscent of aldehydes, specifically, aliphatic aldehydes of the C8 to C12 carbon number. See Flavor Description.

Al Dente – Literally ‘to the tooth’. A degree of cooking (usually grains and pasta, not beans) that gives a little bit of resistance to the chew and is not mushy. See Culinary Arts.

Alfalfa (Medicago sativa L.) – Usually eaten as sprouted seeds that develop greater flavor and are also easier to digest. The natural extract containing xanthophyllic colorants (lutein dipalmitate, etc.) are used as coloring additives for grains so that poultry egg yolks will obtain a bright desirable yellow coloration. See Grains, Chart 16 – Alfalfa, and Appendix 2 – Nutraceuticals Overview.

Alfredo – A sauce or style made with butter, garlic, cream, Italian cheese (typically Parmesan or Romano), with black pepper. Alfredo sauce is usually served with a pasta called fettuccini. See Culinary Arts.

Algae – The group of simple plants that contain chlorophyll, but do not have a vascular system, that is, roots, stem, etc. These plants include the seaweeds. The body of the seaweed or algae is called the thallus. Out of the more than 20,000 species of seaweed, only 40 to 50 have a pleasant taste. Four different types of algae are listed. Brown algae (Phaeophyceae) is the most common. The yellow and brown xanthophyllic compounds actually cover up the green from the chlorophyll in the plant. Edible types include arame (Eisenia bicyclus), hijiki (Hizikia fusiiforme), wakame (Undaria pinnatifida), and kombu (Laminaria spp.), which is high in glutamic acid. Red algae (Rhodophyceae) is colored by a natural pigment called phycoerthrin. The pigment covers up the green of the chlorophyll in the algae. The red variety of algae is usually used to derive most algal thickeners. Dulse (Palmaria palmata) with a strong flavor, nori (Porphyra spp., asuki nori [P. tenera]), of which sheets are made to serve the sushi trade, carrageenan (Chondrus crispus), also known as Irish moss, and agar agar (Gelidium spp.) are included here. Galactose is usually the sugar that combines with polysaccharide to form viscous polysaccharides. Green algae (Chlorophyceae) are
devolved of other pigments, and include kelp (Macrocytis pyrifera), sea lettuce (Ulva lactuca and Ulva fascia), and sea grapes (Caulerpa spp.). Both latter varieties have a green vegetable taste like lettuce. Glasswort is included here as a seaweed as it grows in marshes throughout the world. Blue-green algae (Cyanophyceae) are usually microscopic plants. Included in this group is spirulina, an algae-based health food. Eaten by ancient people of Africa and the Aztecs, it is formed into a sweet pancake called a dihe, or added to millet or vegetables with a thick tomato sauce like chillimolli. See Gums and Thickeners.

Algae, Green Blue – See AFA and Appendix 2 – Nutraceuticals Overview, Nutraceuticals Overview.

Alginates – Ammonium, calcium, potassium, and sodium alginites. See Gums and Thickeners.

Algorithm – A set of rules and sequence of events or parameters that set the stage for the next sequence of events designed to solve a problem. Usually having to do with computer programming. The quality of the computer algorithm dictates the accuracy of computerized interpretation of GC or MS data. See Gas Chromatography (GC), Internal Standards.

Aliphatic – As opposed to aromatic, a chemical compound that does not contain a benzene ring. These include straight-chained, branch-chained, and non-aromatic cyclized compounds containing carbon, hydrogen, and oxygen (also called cyclic aliphatic structures). See Aromatic, Benzene Ring, and Appendix 2 – Nutraceuticals Overview.

Alkali – A substance which, when added to water, raises the pH above 7.0. See Acid, Alkaline.

Alkaline – A chemical state in which an abundance of hydroxyl ions (OH) is present in an aqueous system. To be alkaline is to have a pH greater than 7.0. See Acid.

Alkaloids – GRAS ingredients that fall into this category, like caffeine and theobromine, must be used sparingly. By definition, alkaloids are very complex compounds that can have a biological effect on the user. The term alkaloid derived from alkali-like refers specifically to the presence of nitrogen in the molecule. Theobromine (demethylated caffeine) is found in chocolate. Caffeine (methyl theobromine) is found in many items including chocolate, coffee, tea, and some common extracts. Some alkaloids are highly toxic. See Caffeine, Theobromine, and Chart 17 – Alkaloids.


Alkekengi (Physalis alkekengi) – Also known as a Chinese lantern or Cape Gooseberry. It is a fruit with a thin membranous covering resembling a Chinese lantern called a calyx. The flavor is acidic, very juicy, and has an astringent aftertaste. The seeds are also edible. See Gooseberry.

Alkyl – Non-Aromatic Hydrocarbons – As opposed to aromatic compounds, that is, chemical compounds which contain at least one or more benzene rings. 1,3,5 undecatriene is found in many natural products, and has a very green and piney flavor. It has been isolated from apple, celery, kiwi, mandarin, parsley, passion fruit, pear, peach, pineapple, peppermint, and galbanum, and is therefore an important component for flavors. See Benzene Ring, Aromatic, Hydrocarbons, Cyclic Compounds, Terpenes, and Chart 18 – Hydrocarbons - Alkyl Non Aromatic.

Alkyl Esters – Esters made up of an alcohol or acid, one of which at least is an alkyl compound. See Chart 146 – Alkyl Esters Grouped by Alcohol Moiety and the general ester charts for all alkyl esters. See Esters, Alcohol, Acid, Methyl Esters, Ethyl Esters, Propyl Esters, Butyl Esters, Amyl Esters, Hexyl Esters, Cyclohexyl Esters, Heptyl Esters, Octyl Esters, Nonyl Esters, Decyl Esters, Allyl Esters, Hexenyl Esters, Floral Esters, Floral Terpene Esters, Linalyl Esters, Geranyl Esters, Citronellyl Esters, Terpinyl Esters, Alkyl Esters.

Allergens – Food allergens are often confused with food intolerances, or food sensitivities. Food intolerance is the body’s difficulty to metabolize certain substances. These include lactose and other substances. Intolerance to an ingredient usually is due to a lack of a certain enzyme or a reduction of that substance in the body to a point where it is no longer effective. Lactose is digested by the enzyme lactase. Sensitivities such as chemical sensitivities, sulfite sensitivity, and sensitivity to monosodium glutamate can have varying degrees of severity and are much harder to identify. Sulfite sensitivities have proven to be fatal in rare instances. However, common food allergies, that is, those that elicit production of the immunoglobulin IgE, are easier to understand. Most food reactions are not life threatening, although are very bothersome to extremely problematic. Asthmatic reactions and respiratory congestion are the more difficult symptoms. Those with these types of allergies can be treated with antihistamine-type blockers or rescue inhalers, or in very severe instances, must go to the nearest emergency room. However, the most severe reaction is one called anaphylaxis, where the body can totally shut down and result in death within minutes. This is so severe that those who have been diagnosed with this potential reaction must carry an epinephrine auto injector with them at all times to avoid a deadly reaction in case of accidental exposure. These injections are called epipens. The major allergens are listed below. It must be pointed out that the most
severe reactions have been typically found within the groups that have an asterix. Phenylketonuria is the inability to digest the amino acid phenylalanine. This is especially important in that phenylalanine is one of the two components used to develop aspartyl phenylalanine or Aspartame. See Food Allergen Labeling and Protection Act of 2004. Most foods however are not totally innocent, and allergic reactions have been seen for certain fruits (strawberries, peaches, etc.), vegetables (mushrooms, bell peppers, etc.), and others. There are some cross responses between animal and vegetable products. It is thought that the protein tropomycin, which is found in varying amounts in dust mites, crustaceans, and bell peppers could be an example of this. Putative allergens are those that specifically react with IgE immunoglobulins in the bloodstream. As published by ServSafe™, only eight food categories cause 90% of all food allergy reactions and out of those, nuts cause four out of five fatalities. And twice as many people are allergic to shellfish than to nuts. See Chart 19 – Allergens.

Allergies – Allergy – See Food Allergy.

Allicin – Found in garlic. See Appendix 2 – Nutraceuticals Overview.

Allopathic Medicine – Coined by Samuel Hahnemann, the founder of homeopathic medicine, to describe present and conventional medical practices. See Homeopathic Medicine.

Allspice – See Pimento and Appendix 2 – Nutraceuticals Overview.

Allumette – See Knife Cuts.


Allyl Compounds – The esters of the singly unsaturated propenyl alcohol (allyl alcohol) are generally harsher and more pungent than their saturated propyl counterparts. The compound allyl caproate is felt by many to be the most pineapple like of any of the GRAS esters, although it is not nature identical (not found in nature). The allyl GRAS ingredients are quite varied ranging from the fruity esters to the sulfur containing garlic (allyl disulfide, allyl mercaptan) and mustard (allyl isothio cyanate) notes. See Nature Identical, Pineapple, GRAS, and Chart 20 – Allyl Compounds.

Allyl Esters – See Allyl Compounds.

Allyl Isothiocyanate – Also known as mustard oil. Allyl isothiocyanate is the sulfur compound characteristic of influenoate and bulb vegetables like horse-radish, broccoli, mustard; it is formed through enzymatic conversion of a glycoside through the action of the endogenous glucosidase enzyme. See Mustard, Lachrymator.

Almond, Bitter (Prunus spp.) – Almond as a nut is derived from the Prunus species such as P. dulcis or P. amygdalus. The Romans referred to almond as the Greek nut. A green husk that opens when the almond is fully grown surrounds the almond. From a legal perspective, the oil of bitter almond can come from specified sources. These sources include the pits of peaches, cherries, plums, apricots, and from almonds themselves. Almonds can be classified into two categories: bitter and sweet. The bitter almond oil (P. amygdalus var. amara) contains HCN and other toxins, which must be removed before the bitter almond oil is suitable for food use. The sweet almond (P. amygdalus var. dulcis) is the edible seed known as the almond as commonly consumed. There is a lesser amount of amygdalin in sweet almond oil than in the bitter variety. Note: Amygdalin, which is the component used to make Laetrile™, is attacked by endogenous amygdalase to form benzaldehyde and HCN (prussic acid). Therefore, derivatives for food use must be FFPA (free from prussic acid). Bitter almond can be derived from a number of different foods including prune pits, almonds, cherry pits, peach pits, and apricot pits. See Benzaldehyde, Chart 21 – Bitter Almond, and Appendix 2 – Nutraceuticals Overview.

Almond Oil, Bitter – The essential oil obtained from the distillation of the partially de-oleated press cake of crushed seed meats inside the hulls of the pits of prunus (bitter almond [Prunus amygdalus], apricots [Prunus armeniaca], plums [Prunus domesticus]), amygdalus (peach [Amygdalus persica]) or cerasus (cherry [Cerasus sp.]) species. Amygdalin (used to produce the controversial cancer treatment chemical laetrile) is a glucoside, which when attacked by endogenous type enzymes (amygdalase) is broken down into hydrogen cyanide (a poison that produces cyanosis), and benzaldehyde. Bitter almond oil is approximately 90–95% benzaldehyde. Because of the presence of cyanic acid, a poison, the oil must be treated, altering all of the HCN to ferrocyanide (Prussian blue), or removed by other means. This oil is then termed FFPA (free from prussic acid), and is acceptable for use in flavors. Although the yield of the oil seems to dictate a correspondingly high cost, alternatives of naturally derived benzaldehyde alternatives have recently hit the marketplace. These ‘natural’ alternatives use a variety of catalyzed oxidative pathways and other means to develop the aldehyde commercially. See Cyanosis, FFPA, Natural (Flavors), Aldehydes (Aromatic).

Aloe Extract (Aloe spp.) – Aloin, its active constituent varies from 5–25%. Aloe is also used for its healing properties and benefits to the skin. See Bitter, Chart 22 – Aloe, and Appendix 2 – Nutraceuticals Overview.

Aloe Cape (Cape Aloe Ferox) – See Appendix 2 – Nutraceuticals Overview.
Aloe Vera – See Appendix 2 – Nutraceuticals Overview.
ALOP – Appropriate Level of Protection. See HACCP, Food Safety.

Alpha, α (Greek A, α) – Chemically, a structure that is next to or adjacent to another specified structure. Example: Alpha ionone indicates that the double bond is next to the 3-butene 2-one structure, while beta ionone indicates that the double bond is one carbon away from it. See Trans (Isomerism), Cis (Isomerism), D (Isomer), L (Isomer), DL (Isomer), Chemical Structure, Meta, Ortho, Para, Beta, Gamma, Delta, (Z), (E), Tert, Iso, Enantiomer, Racemic, Omega, Sec.

Alpha Risk – The risk of being wrong by not being able to show samples to be the same, and declaring them different instead, or said a different way, the risk of concluding the samples are different from each other when they are really the same. The risk in this is coming out with what you think is a product improvement, when there really is none. In this, a company might risk credibility. A value from 0.1 to 0.05 means that there was a slight trend that the sample was not different and the tester was wrong. A 0.05 to 0.01 value means that there was a moderate trend that the tester saw a difference when there was none. A value of 0.01 to 0.001 means that there was strong evidence to show that the tester claimed there was a difference and there was none. A value for the alpha risk of less than 0.001 means that the evidence that the sample was different was very strong, but it was in fact, not. See Beta Risk; Pd (Proportion of Discriminators); Sensory Evaluation; Statistics, Statistical Analysis.

Alternate Forced Choice – In a set of two or more items, an AFC test decides which defined criteria and the direction (more of or less of something). See 2-AFC, 3-AFC, Sensory Evaluation.

Alternative Hypothesis – The opposite of the null hypothesis wherein there is no correlation between two factors, the alternative hypothesis relates to a correlation between two factors. In statistics, if an outcome is determined to be unlikely to have occurred by probability alone, the result is called statistically significant. See Statistical Significance, Sensory Evaluation, P-value.

Alternate Source – Alternate Supply – When crop shortages or price increases occur due to one reason or another, alternate suppliers might be brought in. In a well-run HACCP system, the alternates are reviewed and analyzed for all aspects of safety and quality. See HACCP.

Althea Root (Althaea officinalis) – See Marshmallow and Appendix 2.

Althea Root – See Chart 23 – Althea Root.

Amadori Rearrangement – A chemical reaction where one molecule undergoes a change or rearrangement in molecular configuration and forms another perhaps more stable molecule. The first step in the Maillard reaction is the development of an n-substituted glycosylamine a Schiff Base product which is very unstable and undergoes an Amadori Rearrangement forming chemicals like pyrazines. See Maillard Reaction, Schiff Base Reaction, Pyrazines, Browning, Non-Enzymatic Browning, Enzymatic Browning.

Amaranth (Amaranthus spp.) – Like quinoa, the Spanish forbade the growing of this grain when they conquered the ancient American cultures (Aztecs). However, the plant is drought resistant, which makes it especially interesting as a source of nutrients during tough weather conditions. Similar to quinoa and buckwheat, amaranth is not really a cereal, but it is used as such and ground into a flour for cooking. It is a highly colored grain whose flowers are often bright red. It was used as a coloring agent by the Hopi Indians and in foodstuffs as well. Today Red Dye #2 is used instead in certain instances. See Grains, Color (Colorants).

Ambregris – Often as a tincture (Source: Physeter macrocephalus or P. catodon). A very rare and expensive ingredient that is not commonly used in flavors, caused by the pathological condition in a whale’s stomach due to indigestible food particles. Ambregris is also called ambra to avoid confusion with tinctures of fossil amber used in fragrances. See Castoreum, Civet Absolute, and Chart 24 – Ambregris.

Ambient Conditions (Ambient Storage Conditions) – Ambient conditions are defined as the ever-changing conditions of temperature, moisture, and light that occur during normal storage conditions. What are ambient conditions to a warehouse in the South might however be drastically different from those in an office R&D facility in Chicago, Illinois.

Ambient Temperature – Ambient temperature is a somewhat confusing terminology. Some citations refer to it as the temperature of the environment, whatever that is. Others say it is the temperature in a closed environment like a storage room or box. It is much more accurate to define a temperature range after the term ambient temperature to mean a reasonable environmental fluctuation with this given range. See Temperature, Heat, Storage Conditions, Warehouse.

Ambra – See Ambregris.

Ambrette Seed (Hibiscus abelmoschus L.) – Musky and heavy with limited use in flavors. Some have reported using ambrette seed oil in pear flavors, apple flavors, and cheese products. Contains the macrocyclic musk, ambrettolide. See Musks and Chart 25 – Ambrette Seed.

Ambrosia – In ancient Greek mythology, the food of the gods (nectar being the drink of the gods).
Another such wondrous description for a food is manna (from heaven) as written in the Bible. Recently, the term ambrosia relates to a sweet-tasting liqueur, or a tasty dessert made of fruits, gelatin, and whipped cream. See Culinary Arts.

**Amelioration** – The act of balancing the starting materials of a wine must before fermentation by the addition of necessary amounts of sugar, water, or grape concentrate. See Wine, Balance, Fermentation, Sugar(s) and Polyhydroxyl Compounds.

**American Institute of Baking (AIB)** – A baking industry organization that oversees the AIB Audit, a quality control quality assurance audit for bakeries, food ingredients manufacturers, and food manufacturing plants. See FPA, FPA – Safe Audit, and NFPA Safe, AIB Audits.


**American Pennyroyal** – See Pennyroyal.

**American Society for Testing and Materials** – See ASTM.

**American Spice Trade Association (ASTA)** – An organization of spice suppliers and users that sets standards for testing the quality of spices. ASTA units are commonly used measurements of the color value of ground paprika powder. See Spice and Appendix 1, Abbreviations and Acronyms.

**Ames Test** – Originally developed by Dr. Bruce Ames for the purpose of screening potential carcinogenic chemicals. This and other similar test were conceived in response to the Delaney Clause. The Delaney Clause is still on the books, but has not been actively enforced in recent times due to the sensitivity of today’s instrumentation. When the Delaney Clause was first passed, it was surmised by Dr. Ames that cell mutagenicity implies human carcinogenicity. Therefore, the Ames test measures cell mutagenicity potential. Test cells of E. coli were exposed to chemicals, and DNA comparison of those cells was undertaken to see if any of the test cells showed that they have mutated. Recently, this test has fallen into lesser use in favor of other screening techniques. The Delaney Clause states that no substance can be used in foods at any level if it has been shown that it contains an ingredient in it that has shown anywhere at any level to be a possible carcinogen. Since the passage of Delaney, more sensitive instrumentation has picked up carcinogens almost everywhere in cooked foods, albeit at minuscule amounts. The concept of de minimus, or too small to have an effect, has now been considered. See GRAS, Carcinogenicity, FEMA, Mutagenicity, Safety, Toxicology, FDA, Regulations.

**Amides** – Secondary amines attached to a carbonyl group (NH-C=O—). It is the amide linkage that ties amino acids to each other to build complex proteins. An amide linkage of geranyl amine and cyclopentyl ethanol that has an Umami effect. See Protein, Protein Expression, nerve Receptor, and Chart 26 – Amides.

**Amines (Primary, Secondary Non-cyclic) and Ammonium Compounds** – Chemically, an amine is an organic compound that contains a nitrogen atom. Primary amines have an R1-NH2 group, secondary amines have an R1-NH-R2 group, and tertiary amines have an R1-NR2-R3 structure. The primary amines and ammonia compounds are listed together because they share a typical fishy, ammonia odor. These products could be useful sources for the Maillard Reaction. Secondary amines are listed under the section ‘Secondary Amines, Pyridines, Pyrazines, and Pyrimidines.’ Secondary amines combined with sulfur atoms are listed under the section ‘Thiazoles, Thiazolines, and Thiazole Compounds.’ See Ammonia, Pyrazines, Secondary Amine, Pyridine, Pyrimidine, Pyrrole, Quinoline, Chart 27 – Amines, and Figure 4.

**Structures of Amides and Amines**

<table>
<thead>
<tr>
<th>Where R is any other chemical structure (moiety)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1-C-N-R2</td>
</tr>
<tr>
<td>Amide</td>
</tr>
<tr>
<td>R1</td>
</tr>
<tr>
<td>R2</td>
</tr>
</tbody>
</table>

Amines are classified as to the number of hydrogens attached to the nitrogen atom. If three hydrogens are attached, the amine is classified as a primary amine. An amino acid typically has a primary amine attached.

**Primary Amine**

Glycine

![Primary Amine](chart)

In a secondary amine the nitrogen has only one hydrogen attached.

**Secondary Amine**

Pyrazine

![Secondary Amine](chart)

A tertiary amine is where the nitrogen has no hydrogen attached.

**Tertiary Amine**

Allyl isothiocyanate

\[CH_2=CH-CH_2-N=C=S\]

![Tertiary Amine](chart)
Amines (Secondary, Cyclic) – See Pyrazines, Pyridine, etc.

Amino Acid – Because they are the building blocks of proteins, amino acids are a necessary nutrient. Twenty-two amino acids have been isolated that represent components found in natural proteins. Of these, eight are considered essential because the body does not produce them, and must therefore derive them through the intake of food. In addition, there are 200 other amino acids that are not found in proteins, but that play an important role in cellular processes. Amino acids are chemicals that contain an amino (nitrogen plus hydrogen) group and an organic acid group. An organic acid group is called a carboxyl group made up of a carbonyl = carbon plus oxygen and an alcohol = oxygen plus hydrogen). Amino acids or proteins can react with reducing sugars to produce roasted aroma compounds via the Maillard Reaction. Because an amino acid has both a basic (alkaline) segment (the amino group), and an acid segment (the carboxyl group), the ionized molecule is called a zwitterion. The pH at which these ionized molecules are at the greatest amount is called the isoelectric point for that particular compound. The 22 main amino acids are grouped as shown in Chart 28 – Amino Acid Groups.

Proteins are expressed through the RNA/DNA mechanism. Protein structure is crucial to their performance. Proteins are folded due to internal attractions and lose molecular bonding. This folding is determined by the amino acids that make up the proteins and the structure of the nitrogen site. Primary amines form straight protein chains. Secondary amines form folded or helical protein structures. Tertiary amines form double folded structures. Quaternary amines form bundled or doubled folded structures. The nature of the shape of the protein is very significant in its overall reactivity and properties. See Maillard Reaction; Reducing Sugar; Roasted (Notes); Pyrazines; Thiazoles, Thiazolines, Thiazyl Compounds; Pyridine; Strecker Degradation; Amadori Rearrangement; Essential Amino Acids; Nucleic Acid; Enhancers; Isoelectric Point. Note: Not all of the amino acids listed in Chart 28 – Amino Acid Groups are food approved. Please check status of each.

Aminoid – Reminiscent of the aliphatic amines, fishy. See Amines (Primary, Secondary Non-cyclic) and Ammonium Compounds.

Amioca (Starch) – Starch obtained from waxy maize corn (as opposed to starch that is obtained from dent corn or tapioca root). See Starch and Appendix 2 – Nutaceuticals Overview.

Ammonia – A gas (NH$_3$), which has a typical (ammoniacal) odor. It is often dissolved as a 40% saturated solution in water. Ammonia-like compounds are by-products of decomposing protein matter. This is the reason for the ammoniacal odor of rotting fish. See Fishy, Nitrogen Compounds.

Ammoniacal – An aroma that is reminiscent of ammonia, having an ammonia-like or spoiled fish-like odor. See Amines (Primary, Secondary Non-cyclic) and Ammonium Compounds.

Ammoniated Glycerrhiza – See Glycerrhizin.

Amoore’s Theory – The theory that odor chemicals (odorivectors) fit into certain molecular jigsaw-like ‘holes’ in the nerve endings of the olfactory nerve exposed in the olfactory bulb region. It is the fit of a chemical into a certain hole that elicits a response to the brain corresponding to the recollection of the odor memory, according to Amoore. Some research has confirmed the theory in principle but equates the reaction to that of an enzyme upon a substrate with a corresponding excitation energy developed that then is transmitted along nerve endings. Recent theories presented by Luca Turin pose that odors are perceived by the body differently based on their vibrations. The initial theory was based on the fact that both visual and sounds cues were based on frequencies on one sense, sound wave frequencies, and on the other, visual light frequencies. A recent paper published by The Rockefeller Scientist. The URL for this publication is http://www.rockefeller.edu/pubinfo/news_notes/rus_032604_b.php. See Odorivector, Aroma, Sensory Perception, Descriptive Analysis.

Ampholyte – A liquid ionic carrier that is capable of either reacting as an acid or a base. See Zwitterion.

Amuse Bouche – Literally to amuse the mouth, an amuse bouche is typically a small culinary delight served in a restaurant as an appetizer, palate cleanser or as part of a tasting menu.

Amygdalin – The glucoside, which by endogenous enzymatic action of amygdalase, produces benzaldehyde and cyanide. This is found in peach pits, apricot pits, plum pits, cherry pits, almonds, pear pits, and apple seeds. See Bitter Almond Oil, Benzaldehyde, Persic Oil, Hydrogen Cyanide.

Amyl Acetate – Also known as banana oil. Amyl acetate is used in nail polish remover for both its aroma and salivation properties. It is found in numerous natural products. Its main aroma description is inexpensive banana like, but is used to blend with other esters to give a fruity sweet roundness as most esters of the C-7 type. It is most famous as a single component flavor ingredient in chewy puffed peanut-shaped candies. It is also used to test the effectiveness of carbon filtered fitted respirator masks. See Banana, Esters, Fruity, Solvent.

Amylase – The enzyme that breaks down starch molecules into glycogen and maltose. See Enzymes.
Amyl Cinnamyl Compounds – Amyl Cinnamyl Compounds are generally heavy and resinous. They can find use as background characters for many brown flavors like vanilla, honey, chocolate, and even fruits like berries. See Cinnamates and Related Compounds. See Chart 30 – Amyl Cinnamyl Compounds.

Amyl Esters – See Alkyl Esters and Chart 146 – Alkyl Esters - Grouped by Alcohol Moiety.

Amylograph – A time temperature starch/viscosity measuring device. Brabender™ is one example of a company that makes these types of instruments. See Starch, Syneresis, Food Technology.

Amylopectin – The branch chained polysaccharide that makes up a starch. See Amylose, Starch, Modified Food Starch, Gums and Thickeners.

Amylose – The straight chained polysaccharide that makes up a starch. It can, however, form helical structures due to hydrogen bonding. Amylose is a better film former than amyllopectin and gives the mother starch a good degree of setting potential. It is more apt to retrograde, however and is harder to cook out. It is still easier to cook out than a fluidity starch used in starch candies. See Amylopectin, Fluidity Starch, Retrogradation, Syneresis, Modified Food Starch.

Amyris – See West Indian Sandalwood.

Anaerobes – Organisms that survive and thrive in the absence of oxygen. See Anaerobic Bacteria.

Anaerobic Bacteria – Those microorganisms that grow in the absence of air. One of the better-known anaerobes and perhaps the deadliest is Clostridium botulinum. The toxin of that organism is one of the most powerful known to man. Luckily, contamination of C. botulinum is rare. When it does occur it is usually in canned food where the pH is higher, and a seam in the can might have split. A pH below 4.5 and proper canning techniques usually are sufficient to avoid this problem. Although the spores are extremely resistant to heat, the application of a sufficient amount of heat degrades the toxin produced by the spores. The potent toxin is responsible for a 40% mortality rate if ingested. See Microbiology.

Anaerobic Organisms – Organisms that thrive in environments absent of oxygen. See Anaerobic Bacteria.

Analysis of Variance – A statistical method that tabulates the comparison between the spread of values within multiple candidates, products, or examples. Multiple comparison procedures are used to evaluate three or more examples. This system is often used to plot attribute ratings for panelists. Both sensory data and consumer data use multivariate testing. This procedure analyzes complex data. Linear regression is a method to fit lines to data, and scatter plot analysis is used to define a locus of interrelated points. See Sensory Analysis, Statistics, Statistical Analysis, T-Test, Multivariate Analysis.

Analytical Chemistry – The branch of chemistry that deals with the testing and analysis of substances. In analytical food chemistry, gas chromatographic (GC) analysis, high pressure or high performance liquid chromatography (HPLC), and mass spectroscopy (MS) analysis are some of the techniques employed.

1. Acid Value of Fats – A determination of the free fatty acids (FFA) in a fat. The more critical test is the report of FFA. See Free Fatty Acids.
2. Active Oxygen Method (AOM – AOCS Cd 12-57) – Measures oxidative stability of an oil by bubbling air into a fat at a certain temperature.
3. Alkaline Soaps (AOCS Cc 17-95) – Measures the reactivity of metals on fats in water to determine the relative instability of a fat.
4. Anisidine Value (AOCS Cd 18-90) – Measures the aldehyde content of a fat, a measure of the degree of partial oxidation.
5. Arsenic, Lead, and Heavy Metals (FCC III) Third Ed. – An analytical to determine the presence of trace lead, arsenic, and other heavy metals and subsequent food grade status.
6. Ash (FCC III) – Flamed oxidation test of acid soluble, acid insoluble ash, and total ash.
7. Curcumin Test (FCC III) – Spectrophotometric assay of the coloring principle of turmeric.
8. Enzyme (Alpha Amylase Titrametric Test using Iodine/Starch reaction) and others (pages 479 to 499 FCC 111).
9. Fatty Acid Methyl Esters (FAME AOCS Ce 1-62) – Determines the fatty acid composition of a glyceride.
11. FreeFatty Acids (FFAOCC Ca 5a-40) – Measures by titration, the non-attached fatty acid ratio in an oil.
12. GLC Profile (FCC – EOA Method) – Uses relative retention time and internal standards for the identification and separation of volatile materials by GC.
13. Infrared Photospectrometric Method (FCC III) – A match of an unknown material to a standard fingerprint pattern. Also called Ramen Profile.
14. Iodine Value (AOCS Cd 1-25) – Measures the degree of unsaturation of an oil and therefore
the degree of potential instability due to oxidative rancidity.

15. Kjeldahl Nitrogen Assay – Determines the amount of nitrogen present (mostly from amino acids and proteins).

16. Karl Fischer Determination – Pyridine based titration used to detect small amounts of water. (See Number 17, Loss on Drying below.)

17. Loss on Drying (FCC III) – A sample heated to constant weight (water driven off), analytically weighed, and calculated.

18. Oil Stability Index (OSI AOCS Cd 12b-92) – Measures the content of formic acid present as a measure of the degree of oxidation of an oil.

19. Optical Rotation – An instrumental analysis indicating the degree of rotation of polarized light by an optical active chemical. A clockwise rotation is a dextrorotatory (d or +) and a counterclockwise rotation is laevorotatory (l or −). A substance that has both dextro- and laevo-rotatory species in equal amounts is called racemic (dl). Substances that share the same structural and chemical formulae but are different by optical isomerism are called enantiomers of each other.

20. Peroxide Value (PV AOCS Cd 8b-90) – Measures the degree of peroxides present as a measure of the amount of partial oxidation of an oil.


22. pH (FCC III) – The determination is usually done by electrode, pH paper, or titration, although electrode is far more accurate and more prevalent.

23. Polar Materials (TPM AOCS Cd 20-91) – Considered one of the most important tests for the determination of the degree of oxidation of an oil. It measures the total amount of non-lipid compounds in a fat system.

24. Polymers (AOCS Cd 22-91) – Includes dimers, trimers, and tetramers, or dark shellacs of oils formed on surfaces of ovens, etc., indicating the degree of oil degradation other than polar compounds.

25. Refractive Index – An instrumentally measured test that determines the degree of change of the angle of incidental light as it passes through a substance (also can be used as an indication of purity).

26. Saponification Value – Amount of sodium hydroxide to neutralize free fatty acids.

27. Scoville Heat Units (FCC III) – A dilution/comparison taste test to determine the heat principle, capsaicin, present in oleoresin of capsicum.

28. Solidification Point (FCC III) (or Melting Point) – This test can be run by an instrument that slowly lowers the temperature of a known sample until solidification is reached.

29. Specific Gravity – The weight per volume of a given liquid versus that weight of water at the same volume at a given temperature (usually 20 degrees Centigrade). This, like optical rotation can be a measure of flavor raw materials, but is a poor measure of finished flavorings.

30. Spray Dried Efficiency – (Entrapped Oil) = Total Oil – Surface Oil/Total Oil.

31. Surface Oil (Spray Dried Material) – Using ethyl ether or other non-aqueous solvent, gently mix powder and evaporate analytically. The surface oil is then weighed.

32. Thiobarbituric Acid (TBA AOCS Cd 19-90) – A spectrophotometric test of TBA reacted oxidation products present in a fat.


34. Viscosity (FCC III) – Ubbelohde Glass Bored Viscometer measures the time a thickened liquid travels from one point to another.

35. Viscosity (FCC III) (Brookfield Viscometer) (Model LVG) – An instrument that measures the degree of friction-based obstruction of a rotating disk due to the viscosity of a liquid in which it is immersed. The variable thickening of a modified food starch as it gelatinizes with temperature is measured by a Brabender Viscometer. A characteristic that is similar to viscosity but not quite the same is flow rate. See Bostwick Consistometer.

36. Volatile Oil Content (FCC III) – Distillation method with a V.O. (Clevenger) trap.

37. Water Determination (FCC III) – Karl Fischer Titrimetric Determination. This is a fairly accurate determination for water using a methanol, a pyridine, and an iodine titrimetric indicator called Karl Fischer Reagent. Other moisture methods include loss on drying and the toluene method.

38. Flow Rate – Bostwick Consistometer. Measuring the rheological characteristics of a semi-liquid at a certain temperature. This apparatus gives a number representing the distance travelled (the scale is built into the unit) by a semi-fluid mass achieved by raising a trap door and measuring a defined time passed. (typically 30 seconds).

Note: AOAC (American Association of Analytical Chemists); FCC (Food Chemicals Codex); AACC (American Association of Clinical Chemists).
See Wet Analysis, Physical, Analysis, Instrumental Analysis.

Analytical Sensory Methods – As opposed to consumer or effective methods, those methods that employ trained or semi-trained panelists. Analytical Sensory Methods include discrimination methods and descriptive methods. See Sensory Evaluation.

Anaphylaxis – An extreme reaction to a foreign substance that can often result in death. See Food Allergy, Allergens.

Anchoy – Salted preparations of tiny fish of the species Engraulis encrasicolus. Anchovies are used in Caesar salads, often added as a paste or whole or diced as toppings on pizza, and commercially, as anchovy paste often used in Worcestershire™ type sauces. Flavor-wise, anchovy flavor has ammoniacal compounds like trimethyl amine and oil type notes from oxidized fish oils. See Amines (Primary, Secondary Non-cyclic) and Ammonium Compounds, Ammoniacal, Fish, Fishy.

Andrographis paniculata (Burm. F) Nees or Kalmegh – See Appendix 2 – Nutraceuticals Overview.

Androstenone – The pheromone that is found in human, dog, and porcine urine, and in certain fungi like truffles. This chemical is perceived in four different ways, with subtle variations: (a) sweet/fruity and almost grape-like; (b) camphoraceous and aromatic; (c) urinary, with sexual undertones; or (d) odorless. Some people can perceive this compound with great intensity and others do not. The very perception of very large molecules like this is not typically accomplished through olfactory organs, but through vomeronasal nerve endings, linked to subconscious and instinctual response. The fact that dogs or boars are used to hunt truffles down is illustrative in that the vomeronasal (sexual) attraction had been exploited without knowing the presence of this compound or the reason why the technique worked. Our intense appreciation of truffle aroma, partly due to their rarity, and partly due to some subconscious stimulus being perceived. The four types of characters perceived by subjects exposed to androstenone might be an odor-based analogy to the response of tasters to PROP. As with PROP testing as an indicator or supertasters, perhaps studies might prove the ability to perceive androstenone could correlate with degree of acuity of both vomeronasal sensitivity and relative olfactory sensitivity. Another interesting hypothesis to the variance of odor response to androstenone might be linked somehow to difference in sex histocompatibility. (Scientific evidence leads to the possibility of the differential attributes being linked to, or indicative of, histocompatibility genotype profiles, aka sex-gene type profiles.) See Vomeronasal Organ, PROP, Taste Buds, Supertasters, Truffles, Mushrooms (food), Specific Anosmia, Specific Agustia, Boar Taint.

Anethole – The characterizing flavor ingredient for black licorice. Licorice or glycerrhiza is usually flavored with anethole to make the black licorice type of profile. Anethole is found in star anise oil and is often found in many other natural products. Anethole is used mixed with methyl salicylate, vanillin, and other sweet/spicy notes like ethyl vanillin, eugenol, camphor, etc., to produce root beer flavors. The cis form is not approved, due to its toxicity, but the trans form is food grade. See Ammoniated Glycerrhiza, Monoammonium Glycyrrhizinate (MAG), Licorice (Root), Root Beer, and Chart 174 – Glycerrhiza.

Angelates – See Unsaturated Esters (Cis 2 Methyl Butenonates).

Angelica or Angelica pubescens or Angelica archangelica – See Appendix 2 – Nutraceuticals Overview.

Angelica Root (Angelica archangelica L.) – Can be used in combination with juniper berry products to create a gin type character. Occasionally used in European type toothpaste flavors. Can be made into a tisane (herbal tea). Used in some dishes to enhance sweetness and minimize the need for adding large amounts of sugar to cut the acidity in some food preparations. Contains angelica lactone. See Lactone, Musks, and Chart 32 – Angelica.

Angola Weed (Roccella fuciformis Ach.) – A rare lichen used to flavor alcoholic beverages. Some species of angola weed are used for their purple coloration. Angola weed has been used to cleanse the hair. See Appendix 2 – Nutraceuticals Overview and Chart 420 – Angola Weed.

Angostura (Galipea officinalis Hancock) – The active constituent is angosturin (Empirical formula C9H12O3). Angostura Bitters™ is a commercial product developed from the botanical. See Bitter and Chart 33 – Angostura.

Anhydro Glucose Unit – The building block of a starch molecule. See Starch, Carbohydrates.

Animal – Reminiscent of animal type aromas. Examples are civet, castoreum, tonkin musk, ambergris, and in some instances, labdanum. Gamey aromas occur in the substituted fatty acids of the C-7 to C-9 type. See Gamey, Flavor Description.

Animal Feeding Studies – See Ames Test, Toxicology, LD20, LD50.

Animal Feed – Nutritionally based foods designed for livestock: chickens, cows, lambs, pork, etc. Often whole yeasts are used for sources of B vitamins, minerals, etc. Masking flavors are used to cover up off odors coming from vitamin supplements.
However, this is typically more for the benefit of the farmer and less for the animal. There is, however, a side effect for this addition in that animals become imprinted upon an early age to these aroma volatiles and might show a resultant affinity or preference to that brand. This has no positive result except to the flavor supplier and feed manufacturer, of course. See Pet Food Flavors.

**Animal Feed Flavors** – Masking agents that can have an imprinting as well as a masking effect in the long term. See Animal Feed.

**Anions** – Negatively charged ions. See Cations.

**Anisates** – See Benzoates and Benzyl Esters (particularly p-methoxy benzoic acid esters) and Anisyl Esters and Anisates.

**Anise (Pimpinella anisum)** – The family that anise belongs to is Umbelliferae, which means it is related to members of the carrot family, that includes dill, fennel, coriander, cumin, and caraway. The active ingredients are trans anethole (approximately 90%) and methyl chavicol. The botanical is a fruit and improperly called a seed. Anise-flavored liqueurs are very popular in many different countries; Pernaud™ is an anise-flavored French liqueur. Pastis the generic French term for any anise-flavored alcoholic drink. Other similar anisic alcoholic drinks are Sambuca™ (Italian), Anisette™ (Italian and North African), Ouzo™ (Greek), and Raki™ (Turkey), and other similar anisic liqueurs from throughout the world. The trans isomer is food grade, however the cis anethole is toxic. Anise, with its sweet smooth aroma profile, is used in many areas as a masking agent for off odors like acid, rancid, or sulfurous malodors. Anise was used in Europe as a bait in mousetraps. It most common usage in flavoring non-beverage foods is in black licorice. See Alcohols, Spice, Licorice (Root), Glycerhiza, Chart 31 – Anise – Aniseed, and Appendix 2 – Nutraceuticals Overview.

**Anise, Star (Illicium verum Hook f.)** – The active ingredient anethole (85 to 90%). See Alcohols, Spice, Licorice (Root), Glycerhiza.

**Anise Star** – See Chart 46 – Anise – Star.

**Anisyl Esters and Anisates** – Anisyl formate is an interesting compound because tasted at very high levels, it imparts a sweet taste, as well as an anetholic or anisyl character. Most anisyl notes and the anisates have a corresponding sweetness. See Anethole, Sweet, Taste, and Chart 34 – Anisyl Esters and Anisates.

**Annotto** – Also called achiote, bija, bijol, roucou, lipstick tree. See Color (Colorants).

**Anogeissus Latifolia Gum (Ghatti Gum, Indian Gum)** – See Gums and Thickeners; Gum Ghatti, Elemi, Tragacanth Gum, Araic, Acacia, etc.

**Anomer** – A type of isomer or epimer of a sugar. Strictly classified as a stereoisomer or diasteromer, it differs in configuration at the hemiacetal or hemiketal carbon also known as the anomeric carbon (the one next to the cyclized oxygen).

**Anosmia** – The inability to smell odors in an individual. This inability could be widespread among many foods or could be specific to certain foods, chemicals, or chemical categories. The corresponding inability to taste is called agustia or ageusia. It could be a permanent state or one that is temporary due to satiation (strong foods or coffee, etc.). See Agustia, Odor, Aroma(s), Volatiles, Temporary Anosmia.

**A-Not-A** – A simple sensory evaluation method that relies on the panelist’s recollection of the previous example. First the testant will be shown a product. It is then removed. Then another product is introduced. The panelist is then asked ‘Is the second product the same as the first?’ So randomness is introduced into the scheme. The following presentation order is recommended: AB, AA, BA, BB. See Sensory Evaluation, Discrimination Test, Two Stimulus Tests.

**ANOVA** – See Analysis of Variance.

**Antepasta** – Meaning before pasta or dinner. Usually a blend of savory meats and cheeses served before the dinner to whet the appetite in anticipation of the meal to come. See Flavor Benefits, Taste, Tongue, Saliva.

**Antetaste (Top note taste, foretaste, or beginning taste)** – The antetaste is followed by the middle ground taste, then background taste. See Flavor Description, Taste, Gustation, Time Intensity Profile.

**Anthocyanins** – A category of natural colors that displays blush to reddish hues. Examples of anthocyanins are betanin, the bluish red colorant of beets, and enocianina, the bluish colorant at high pH to reddish at acid pHs, and the colorants found in grapes and in most berry juices like raspberry, blueberry, strawberry, etc. Anthocyanins contribute to ORAC value as they have oxygen scavenging properties. See Color (Colorants), Carotenoid.

**Anthranilate** – Ortho amino benzoates, anthranilates are generally grape like. Anthranilates also exhibit varying degrees of iridescence. Methyl anthranilate has a slight purplish and violet iridescence in the light. Anthranilates are used in animal feed due to their negative perception by birds (Joint patent developed by this author and Dr. Russell Mason, formerly of The Monell Center, Philadelphia). Anthranilates are found in neroli oil (orange flower oil) and are the characterizing compounds for grape flavors. Enologists often call the presence of anthranilates in wine the foxy character. They are generally heavy

**Antibiotic** – A substance that inhibits the growth of microorganisms. Penicillin was one of the first antibiotics developed. It was initially discovered by accident by Dr. Jenner, when microbial growth around certain penicillium molds was found to be nil. Recently, use of antibiotics in our livestock’s feed supply purportedly to ward off disease and produce more cost-effective livestock, has been a controversial problem. It has been hypothesized that recent ‘super’ strains of microorganisms might be developing in the tissues of livestock due to the ever-present development of resistant strains in nature. Furthermore, the over prescription of antibiotic medications for almost any disease, including viral strains that are resistant to antibiotics, and the misuse of antibiotics by people who terminate antibiotic treatments upon the first signs of relief, rather than continuing the medication to assure the eradication of the invading organisms, further exacerbates the development of resistant organisms. See Pathogenic (Pathological) Organisms.

**Anticaking Agent** – A product, which when added to a powder, will assist in preventing the powder from caking or forming lumps. Many products have been used as anticaking agents, but they fall primarily into two categories: those that protect the powder from external moisture, and those that absorb moisture both internally or externally. Products that absorb water are silica gels, phosphates, etc. Products that protect the powder from external moisture by virtue of their fine particle size are phosphates, silicas, cellulosics, etc. See Silica and Silicates, Phosphates, Cellulose, CFR Definitions 170.3 (o) (1) (from CFR Food and Drug 27), Caking, and Chart 36 – Anticaking Agents.

**Antifoaming and Defoaming Agents** – Antifoam or defoaming agents are listed below. Also specific antifoaming agents for use in beet sugar and yeast production are listed in 173.340 Sections (a)(3) and (a)(4). Antifoaming agents prevent foam from occurring; defoaming agents reduce or eliminate the foam that has already formed. See Defoaming Agents and Chart 37 – Antifoaming Agents.

**Antigua** – A coffee variety from Guatemala that develops a characteristic chocolate/cocoa type flavor upon proper roasting of the beans. See Coffee, Coffee Profiler – Coffee Profile Method.

**Antimicrobial Agents** – Preservatives, bacteriostatic ingredients, and other substances that destroy or inhibit the growth of microbial organisms. See Preservatives.

**Antimyotic Agents** – Substances that inhibit the growth of molds or other fungi. See Microbiology.

**Antioxidants** – A material that retards the reaction of oxygen with a substance. The following are FDA-approved antioxidants and their regulatory citations. See Additives (Food Additives), Preservatives, and Chart 38 – Antioxidants.

**AOAC (Association of Official Analytical Chemists)** – See organizations listed in Appendix 1 – Abbreviations and Acronyms.

**AOCS (American Oil Chemists Society)** – This organization compiles tests and protocols for the determination of the quality of food oils and fats. See Analytical Chemistry.

**AOM (Active Oxygen Method)** – A test that determines potential rancidity of an oil upon extended storage conditions. See Analytical Chemistry.

**APC – Average Plate Count** – One of the typical tests done on a food ingredient to determine overall cleanliness. Average plate counts can vary depending on the source material(s). Items that come from the ground, dairy environments or similar types most likely will have an APC greater than those items which are purely synthetic. The question is whether products come in contact with environmental contamination after or during processing. See Food Safety, HACCP, Environmental Sampling Plan, Microbiological Assay, Yeast and Mold, E. coli.

**Aperitif** – Beverages that are usually alcoholic, served before the dinner to elicit the same appetite-enhancing function as antepasta. Aperitifs often are sweet and spicy or bitter and piquant. See Bitter, Piquant, Antepasta, Flavor Benefits, Taste, Tongue, Saliva.

**Apopin Oil** – See Camphor.

**Appearance Test** – An attribute test that regards the visual attributes of a product, either alone or in combination with other attributes. See Attribute Tests.

**Appetite** – The desire for food. Defined as the pleasant comfortable feeling of food desire rather than the unpleasant feeling of hunger for food. The desire for food is controlled by two sites in the brain: one in the cerebral cortex, and the other in the hypothalamus. See Cerebral Cortex, Hunger, Brain, Ghrelin, Leptin, Satiety.

**Appetizer** – Small quantities of food served before the main meal as a taste preview and experience enhancer/appetite stimulus. Appetizers usually include flavorful bits like spicy seafoods, meats, or vegetables. Some appetizers include antepasta, aperitifs, canapés, hors d’oeuvres, or cocktails. See Aperitif, Appetite, Antepasta.
Apple (Malus spp.) – There are over 7,500 varieties of apple. Some of the more popular fruit types are the Jonathan, Winesap, New York, and Stayman. The Cortland, which was bred from the McIntosh, is large and flat on both ends with white flesh, and aromatic flavor. It does not brown and remains whole when baked. The Melba is medium round and irregular. It is juicy, but browns quickly. The Golden Delicious is elongated, narrowing at the base with five elongated bumps. It is juicy, sweet, and low in acid. The Red Delicious is the same as the Golden Delicious with red streaks in the flesh. The Empire is a cross between Red Delicious and McIntosh, with a flavor like the McIntosh, but it has a greater resistance to browning. The Gala, which is a cross between Cox’s Orange Pippin and both Red and Golden Delicious, is sweet and very aromatic. The Golden Russet has a reddish brown skin with a very good taste, although it browns easily. The Granny Smith was actually cultivated by a grandmother named Smith. Its fruit is larger in size and more acidic than most, and is appreciated in cooking. The Idared is a large apple that stays firm even when cooked. The McIntosh, first created in Canada, has a good, juicy flavor and a good amount of acidity. The Rome Beauty is juicy, and acidic with red stripes and little spots. The Spartan variety is a cross between McIntosh and the Yellow Newton, which has a good amount of sweetness. Apple essence produced by the condensation of air in apple processing plants often has erroneous and arbitrary folds associated that do not represent real ratios to the singlefold fruit. See Essence, Essence Recovery, Folding of Extracts and Essences, Distillate, and Appendix 2 – Nutraceuticals Overview.

Apple Cider – The beverage made by crushing whole or peeled apples. Endogenous enzymes produce a browning reaction that quickly turns the product to a golden brown and produces brown flavor compounds. On the peel, yeasts grown naturally, and care must be taken to either refrigerate the product, use it quickly, or add anti-fermentation products like sulfites, benzoates, sorbates, etc., to prevent the cider from fermenting, producing alcohol, and turning into hard cider. See Fermentation, Apple Jack.

Apple Cider Vinegar – The result when apple cider develops acetic acid through fermentation of apple juice directly or indirectly (through apple jack, apple juice). See Vinegar.


Application Rate – The percentage amount that a flavor is added to a food product base. Also known as the usage level. See Food Technology.

Arabic Gum – Acacia senegal L. Willd, the plant exuding gum as a natural exudation of a tree grown in Senegal. Gum arabic is known as a lower viscosity gum, with high emulsification properties. These specific properties lend themselves to excellent film formation and the formation of high quality elastic matrices in spray drying systems with good oil particle size. Therefore, it makes an excellent spray drying media for very difficult to handle oils like citrus where solubility and oxidative instability problems are a factor. To date, some other gum blends and modified starch plus alternatives have been produced as a replacement for arabic when the product is in short supply. It is reported by many that these alternatives are still not totally as effective as gum arabic and when pricing and availability of arabic comes back in line, many switch back, at least until the next shortage. Acacia seyal or Tahla gum has been used as an extender or replacer for arabic, but these products fall short in some of the true arabic’s special qualities. Gum arabic has been modified as the hydrogen octenylbutane diolate. See Spray Drying, Emulsion, Emulsification, Citrus, Solubility, Oxidation, Crop-to-Crop Deviation, Crop Shortages, Gums and Thickeners, and Chart 164 – Gums and Thickeners.

Argan Oil (Argania Spinosa) – A somewhat obscure oil derived from goats that have eaten the nuts of the argan tree grown in Southwest Morocco. The
goats apparently are attracted to the fruit as catnip affects cats. This predigested product is then harvested and, through a time-consuming process, melted down and purified. It is an oil with a color similar to olive oil but with a slightly reddish cast. Recent studies have shown a possible nutraceutical use to control cholesterol and help fight disease. See Nutraceuticals (Appendix 2 – Nutraceuticals Overview).

Arilode – The structure that sits atop the nutmeg ‘nut’ also called mace. See Mace, Nutmeg.

Arjuna or Terminalia Arjuna – See Nutraceuticals (Appendix 2 – Nutraceuticals Overview).

Armois Oil – See Artemesia.

Arnica (Arnica spp.) – Arnica Montana L. or Leopards bane, Wolfsbane. Arnica is similar to chamomile in flavor profile. See Chamomile, Chart 48 – Arnica, and Appendix 2 – Nutraceuticals Overview.

Aroma(s) –
1. The volatile or odoriferous portion of a flavor profile. Aroma usually connotes a positive odor profile. The words smell or odor is used more often to describe off or undesirable volatile attributes.
2. In wine terminology, the aroma refers more to the volatile profile of the grape versus that of the wine that is called the bouquet. See Attribute, Volatiles, Evaporation, Vapor Pressure, Off Odor, Taint.

Aromatherapy – A range of procedures and treatments that use volatile compounds. Although the concept goes back to ancient civilizations, the practice has recently gained attention once more. The aromas are inhaled or rubbed on the skin or on occasions, ingested. Although there are some preparations, such as menthol, camphor, capsicum, methyl salicylate, and other cooling or heating ingredients that have been long used as topical pre-parations for the relief of pain and irritation, the other internal results and homeopathic gains claimed by aroma therapists have not yet been confirmed scientifically. However, as odors are received by the brain in the limbic system, which controls the most primitive of our emotions, it is likely that flavors trigger very important psycho-physical effects, and aromatherapy has some basis after all. See Menthol and Menthone Derivatives; Cool(ness), Cooling, or Mintyness; Minty; Rubescence; Hot; Trigeminal Nerves; Volatiles; Aroma(s).

Aromatic –
1. Containing a benzene ring.
2. Having a sufficiently high degree of aroma.
3. Possessing an aroma typical of a class of compounds like camphor, menthol, eucalyptol, thymol, i.e., terpenoid-based compounds that have a warming or a cooling effect, with a heavy, resinous, terpene-like profile. See Aromatic Compounds.

Aromatic Compounds – Chemicals that possess one or more benzene rings. A benzene ring is a six-membered ring with alternating double and single bonds between the carbons. If you look at the molecule from a static model, the two pairs of double bonds can alternate between positions in the hexagon. In reality, the electrons are constantly shifting or it is uncertain where they are at any one given time (Heisenberg Uncertainty Principle). The constant shifting of charge is called the electron cloud. This makes for a very stable molecule. Few purely aromatic compounds are GRAS; in fact, benzene (one ring) and naphthalene (two connected rings) are quite harmful and toxic, with mutagenic and carcinogenic properties. See Mutagenic, Mutagenicity; Carcinogenic; GRAS; Hetero Molecule; and Chart 39 – Aromatics. Note: These purely aromatic compounds are devoid of any other elements but carbon and hydrogen. Many other hetero-aromatic compounds are listed throughout the book.

Aromatics –
1. Any number of compounds that have an odor.
2. A group of chemical compounds containing a benzene ring.
3. In culinary arts, aromatics include those sulfurous foods that give intense flavor including onions, leeks, garlic, scallions, and related items. But some broaden the term aromatics to mean any flavor item including herbs, spices, other vegetables, citrus fruits, wines, and vinegars, all of which can be used to enhance the flavor and fragrance of food. See Culinary Arts.

Arrowroot – Possibly derived from an obsolete South American Indian term meaning root flour. Arrowroot has evolved to mean the flour obtained from many different types of roots in general, including the original maranta, zamia, curcuma, and the musa species. Arrowroot is used for flour replacements (for allergic purposes) and to thicken oils without the corresponding clouding effect. Arrowroot powder is twice as effective as a thickener versus flour. Although it is costly and lends itself to culinary preparations, it forms a clear consistency without retrogradation of other starches. See Starch Culinary Arts, Gums and Thickeners, Culinary Thickening Techniques.

Art –
1. The practice or state of being whose sole purpose is to stimulate the senses. The practice of development of flavors is both an art and a science. See Science.
2. A technique or procedure that can be improved upon by experience, creativity, and manipulation.
Artichoke (Cynaea scolymus L.) – The flower bud of a vegetable that was developed from the cardoon, both members of the thistle family. Each leaf is attached to the bottom of the head or heart and when removed is retained partially on the leaf. This structure is called a bract. The leaves, which can have a purplish tint, become softer toward the center. At the very center a hair-like structure called the choke is inedible. The stem and bottom known as the heart is often pickled and served alone. The Provencal variety comes mostly from Europe. Artichoke contains a substance that enhances sweetness after ingesting an acidic substance and is therefore a subject of research in this age of non-nutritive sweeteners. See Vegetable, Vegetative; Non-Nutritive Sweeteners; Chart 50 – Artichoke; and Chart 373 – Non-Nutritive Sweeteners.

Artificial Flavor – Definition of the FDA, from the Code of Federal Regulations, Title 21 Paragraph 101.22: (a) (1) “The term ‘artificial flavor’ or ‘artificial flavoring’ means any substance, the function of which is to impart flavor, that is not derived from a spice, fruit, or fruit juice; vegetable or vegetable juice; edible yeast; herb, bark, bud, root, leaf, or similar plant material; meat; fish; poultry; eggs; dairy products; or fermentation products thereof. Artificial flavor includes the substances listed in PP 172.515 (b) and 182.60 in this section of code except where these are derived from natural sources”. See Natural Ingredients, Nature Identical, Food and Drug Administration, Processing Aids, Incidental Additives.

Artificial Sweeteners – Non-nutritive sweeteners that are also synthetically produced. See Non-Nutritive Sweeteners.

Artisanal – A description of quality and skill, literally ‘skilled in the arts.’ There are many types of artisanal varieties including artisanal cheese, breads, and other foods all of which are produced and created in smaller production units with great care and creativity. See Culinary Arts.

Artisan Movement (The) – A wave of creative and novel verities of beer, wine, and other alcoholic beverages has been created. Smaller local enterprises have developed and carefully crafted smaller batch runs of unique products are now marketed under the ‘artisanal’ category. This also includes chocolates, baked goods and a host of other foodstuffs and beverages. See Marketing.

Arugula (Eruca sativa) – Similar in flavor to watercress. Arugula is also known as rocket. See Watercress, Water Cress.

Aryl – Means aromatic, or containing at least one benzene ring. In flavors, these compounds include the aromatic ester group. See Benzyl Esters, Tolyl Esters, Aromatic, Alkyl.

Aryl Compounds – Chemical compounds that contain at least one benzene group. See Chart 40 – Aryl Compounds.

Asafoetida – An herb of lesser use today in flavors. It has a characteristic garlic/onion aroma and taste.

Asafoetida (Ferula asafoetida L. and other spp.) – The product is extremely harsh and sulfury and does not normally lend itself for use in flavor applications although some of the crushed dried roots are used in curry recipes. The extract contains a significant amount of an ester of ferulic acid. Ferulaldehyde is the active ingredient of maple syrup. Worcestershire Sauce™ uses asafoetida. Ferula narthex is a smaller variety finding use in foods. Chat masala is an Indian spice blend using asafoetida, mint, ginger, ajowan, cayenne, black salt, mango powder, cumin, and dried pomegranate seeds. See Sulfur, Garlic, and Chart 52 – Asafoetida.

Asepsis – The state of being free from viable organisms. See Aseptic Packaging, Standard Plate Count, Microbiological Analysis.

Aseptic Packaging – The process by which a product is both pasteurized and packed in a steam environment. The system is entirely enclosed and is therefore devoid of microbial contamination. Flavors used in these systems exhibit some volatile loss, but the loss of volatiles and the development of off notes are not quite as bad as with the retort process.

Aseptic Processing – The process of producing an aseptic package. See Aseptic Packaging.

Ash – The residue of ignition. The ash test is used to determine the mineral content of a product by igniting an original weight of material at temperatures of about 525°C (approximately 975°F). The residual...
Ash Bark (Fraxinus excelsior [LINN.]) – A bitter tonic and astringent. Also known as prickly ash, tooth-ache tree, American prickly ash, and specifically zanthoxylum clava-herculis and zanthoxylum americanum. See Ash Bark, Nutraceuticals, Chart 53 – Ash Bark, and Appendix 2 – Nutraceuticals Overview.

Ashwagandha – Withania somnifera or Indian Winter Cherry. See Appendix 2 – Nutraceuticals Overview.

Asian Pear (Pyrus ussuriensis and P. pyrifolia) – Also known as the sand pear. Asian pears look like a golden delicious apple and has a taste reminiscent of a pear with a texture of an apple. It is believed that this fruit is an ancestor of the common pear. See Pear.

Asilomar Conference – Held in the conference center at Asilomar State Beach Conference Center in February 1975, this conference is considered a watershed event in the area of genetic engineering. Considering many of the catalysts and other ingredients used in the production of natural chemicals and other ingredients used in the food supply today utilize this technology, its importance cannot be understated for flavorings. The important accomplishments of the meeting were the establishment of principles to eliminate the spread of recombinant DNA, a protocol for recommendations based on the risk assessment of the experiment type and a schema for establishing prohibited experiments. Unfortunately, many opponents point out the lack of total oversight of every experiment conducted throughout the world in secret laboratories. See DNA, Recombinant DNA, Genetic Engineering.

Asparagus (Asparagus officinalis) – The spears or edible shoots of the above species are eaten. White varieties are grown in the dark similar to the process of forcing of chicory (to become endive). Purple asparagus is a fruity-flavored variety and is picked when the spears are only 2 to 3 inches high. Green asparagus is harvested at a height of about 8 inches. See Sulfur.

Asparagus racemosus or Shataveri-kalp – See Appendix 2 – Nutraceuticals Overview.

Aspen – See Poplar.

Aspic – A food that has been added to a gelatin and then placed into a mold. Aspics are usually sour, bitter, or sweet or a combination thereof. See Culinary Arts.

Aspidosperma – See Quebracho.

Assessors – In sensory evaluation another – name for panelists or testers. See Sensory Evaluation.

Association of Official Analytical Chemists – See AOAC.

Associations – See ASTM, FEMA, NAFFS.

ASTA –

1. American Seed Trade Association – A quote from their website: ‘ASTA Promotes the development of better seed to produce better crops for a better quality of life.’ An organization that promotes the exchange of quality seeds.
2. American Spice Trade Association – A quote from their website: ‘The American Spice Trade Association is a United States based organization whose worldwide membership is comprised of the leading firms in the spice industry.’

ASTM – American Society for Testing and Materials. An organization that sets testing standards in the United States. See ASTA, USP, NF, FEMA, NAFFS.

Astragalus Gum – See Gums and Thickeners, Tragacanth Gum.

Astragalus membranaceous – See Appendix 2 – Nutraceuticals Overview.

Astringent – The physical characteristic wherein a drying, puckering, or tightening of the mucosa or lining of the mouth is perceived. Many salts have an astringent property. Also, astringency is often associated with some bitter principles. See Bitter, Salt.

Asymmetric Carbon – A molecular carbon attached to four other moieties labeled R1, R2, R3, R4 in which the mirror image of itself cannot be superimposed. The structure in three dimensions is configured as a tetrahedron around this asymmetric carbon. The result of an asymmetric carbon is the potential for optical isomerism. See Optical Rotation, Chirality, D (Isomer), L (Isomer), and DL (Isomer), Racemic.

Atitlan – A Guatemalan coffee variety with a quality acid character. See Coffee.

Atmosphere –

1. The environment in which a food is eaten, as is in a restaurant. That is, the other sensory cues accompanied with the flavor while it is being perceived. In other words, the flavor’s atmosphere is the environment in which the perception of many secondary senses occurs. Examples of this are the visual cloudiness of orange juice (light), the fizz of champagne or the crunch of a nacho chip (sound), the temperature of meat, the heat of chili (touch and trigeminal sensation). Therefore, the ambience of the surroundings plays an importance in the overall perception of the flavor and the degree to which positive flavor cognition is derived and remembered.
2. The measurement of the normal pressure of air at sea level.
3. The quality of the air around a substance chemically, sensorially, and physically. The atmosphere around a Maillard Reaction brought to high pressures and temperatures is often purged by a nitrogen blanket. In this manner, the replaced atmosphere contains little oxygen, and the development of harmful phenolic substances is avoided. See Food Technology, Oxidation.

Atmosphere, Modified – See Modified Atmosphere.
Atom – The single unit of an element having a certain atomic number and atomic mass. An atom has a specific electron con-figuration that determines how it will behave with other or similar atoms. See Molecule.

Atomic Number – In an element, the number of protons equal to the number of electrons in a non-ionized atom. When an element is ionized, the protons remain the same, and whether or not it receives electrons or gives up its electrons determines the overall charge. Electrons can also be shared. In this example, the resultant bond is called covalent and is devoid of ionic bond. Dipole moments can be derived by the orientation of charge along a molecule even in a covalent system. See Ionization, Atomic Weight, Neutrons, Electrons, Ions, Proton, Dipole Moment.

Atomic Weight – The sum of the mass of all electrons, neutrons, and protons in an atom. The weight of an electron is virtually ‘0’ for the purpose of atomic weight calculations. A neutron is a proton plus an electron, so it is virtually the same weight as a proton. The weight of a proton is defined as ‘1.’ Therefore, the atomic weight or atomic mass is equal to the sum of the protons plus the neutrons. See Isotope, Isotopic Analysis (Isotopic Ratio), Mass, Density.

Atomization – The dispersing of a liquid into a fine spray. This is typically used for (1) dehydration (i.e., spray drying) or (2) for the coating of materials (spray coating) onto a matrix. See Spray Drying.

Atomizer – Referring typically to the part of a spray dryer that sprays the liquid system in a fine mist then to be exposed to the heat of the chamber for dehydration. There are two types of atomizers used in spray dryers; centrifugal head atomizers and spray atomizers. Both have their advantages and disadvantages. See Spray Drying, Spray Atomizers, Centrifugal Head Atomizers.

ATP/ADP Cycle – See Ribose.

Atractylodes microcephela – See Appendix 2 – Nutraceuticals Overview.

Attribute – The perceived characteristic of a food product. See Attribute Tests, Sensory Analysis, Duo-Trio Test, Paired Comparison Test.

Attribute Tests – One of many sensory tests. Tests that measure characteristics such as flavor nuances, textural description, and other non-comparative type tests. See Comparative Tests, Triangle Test, Paired Comparison Test, Sensory Analysis, Directional Testing, Ranking Test, Compared or Comparison Tests.

Au Fait – Ice cream that has interspersed layers of frozen fruit. See Culinary Arts.

Au Gratin – A mode of food preparation, which means that on top of the food breadcrumbs and cheese are added, which is cooked or browned in the oven. The resultant chemistry would include combinations of Maillard browning on both the bread and the dairy systems. Lactose would act as the reducing sugar, and proteins and amino acids inherent in the system would feed the non-enzymatic browning. See Culinary Arts.

Au Jus –
1. A mode of preparing meat where the juice from the cooking process is added back, or perhaps first thickened and/or further seasoned.
2. The juice obtained as above. See Culinary Arts.

Autolysis – The self-lysing or the internal breakdown of non-water-soluble components into simpler more water-soluble components. See Hydrolysis, Autolyzed Yeast, Autolyzed Yeast Extract, Natural (Flavors).

Autolyzed Yeast – A yeast that has been brought to an intermediate temperature (one that is far less than cell destruction temperatures), and held at this temperature until an internal enzymatic destruction of more complex proteins occurs. In this process, simpler amino acids are formed. These amino acids have a tendency to enhance taste profiles, while also providing nutrients. Furthermore, they can supply needed components to react with reducing sugars in a subsequent potential Maillard Reaction. See Yeast and Figure 5.

Yeast and Yeast Autolysates

Yeast are single cellular plants that propagate through budding. One species, saccharomyces cerevisiae, is responsible for the metabolism of simple sugars into alcohol by the process we know as fermentation. When grown for the baking or brewing industry, they are known as primary yeasts. When they are collected after fermentation, they are known as secondary yeasts.

| Whole active yeast suitable for fermentation | Not Soluble | Contains Nutrients and Cellular Material |
| Dead whole yeast suitable as a dry medium for seasonings, feed | Not Soluble | Contains Nutrients and Cellular Material |
| Autolyzed yeast suitable as flavor enhancer, starting material for processed flavors where clarity is not important | Not Soluble | Contains Nutrients and Cellular Material |
| Autolyzed yeast extract suitable as flavor enhancer, and clear starting material for processed flavors | Soluble | Contains Nutrients |

Figure 5
Autolyzed Yeast Extract, Autolyzed Yeast, and Related Yeast Products – An autolyzed yeast that has been separated from its insoluble cellulosic materials produced during the autolysis breakdown of the cell wall. Separation of this cell wall material through centrifugation or through other means yields the clear resultant extract called an autolyzed yeast extract. See Natural (Flavors), Meaty, Hydrolyzed Vegetable Protein. See Chart 41 – Yeast Products, Yeast Products.

Autosmia – A disorder of the sense of smell whereby a person smells an odor when there is none present. See Odor, Perception, Olfaction.

Autumnal Flavor – In the parlance of tea descriptive terminology, an autumnal flavor is the first stage of the development of a hay-like aroma. Autumnal flavor is reminiscent of dry leaves in autumn. See Industry Vernacular.

Availability – See A La Minute versus Industrial Scale Production, Sustainability.

Average – The total number divided by the number of individuals. See Standard Deviation, Mean, Mode, Sensory Analysis, Sensory Evaluation.

Aversion – A strong feeling of dislike or opposition to a stimulus. Food aversion can be learned especially if it is associated with a bad experience, or it can be innate for the protection of health due to toxins, produced either biologically or chemically. See Addiction.

Avocado (Persea americana) – Also called alligator pear. It is very high in fat (approximately 15%). Varieties include Haas avocado (dark green with mottled skin) and Bacon Avocado (light green smoother skin). The dip common to Mexican food and made from avocado is called guacamole. This dip is usually made with a citrus (lime or lemon), spices, and alternatively with tomatoes, and other seasonings and vegetables. The skin of the avocado is inedible. Florida and California are the main sources of avocados in the United States. The ‘Old Wives’ Tale’ that avocados do not brown if the pit is left in is indeed true but not for obvious reasons. Polyphenyl oxidase or the enzymatic browning enzyme does not work in the absence of oxygen or in a lower pH environment. Thus the reason why the addition of lemon juice or another acidulant works the same way. See Sulfur, vegetables, enzymes, oxidation, enzymatic browning, non-enzymatic browning, Maillard Reaction.

Avocado Oil – See Appendix 2 – Nutraceuticals Overview.

Avogadro’s Law – Equal volumes of gases at equal temperatures and pressures contain the same number of molecules. One ‘gram molecular weight’ or a mole of gas has $6.02 \times 10^{23}$ molecules. This number is called Avogadro’s number or Avogadro’s constant. See Gram Molecular Weight (Mole).

Avoirdupuis – A system of weights and measurement wherein the pound is 16 ounces, and an ounce is 16 drams. See Gram, Conversions and Definitions.

$A_w$ – Water activity or available moisture. That is, the measure of unbound water and thermodynamic potential of a product. Water activity is important because its measurement indicates the stability of a product in terms of its freshness, microbiological stability, and overall shelf life. See Shelf Life, Microbiology, Accelerated Storage Conditions.

AYE – See Autolyzed Yeast Extract.

Ayurveda/Ayurvedic Medicine – A system of medical treatment mostly used in the Indian subcontinent. It literally means the science of life. This practice, which dates as far back as 3300 B.C. and might even go as far back as 7,000 B.C., employs techniques and herbs. In this system it is believed that ether and air combine to form ‘vata’ dosha, which is the driving force for nerve impulses, circulation, respiration, and elimination. Fire and water combine to form the ‘pitta’ dosha, which is the force of bodily and cellular metabolism. Water and earth elements combine to form the ‘kapha’ dosha, which is responsible for growth. The usage of some of the nutraceuticals mentioned in this book go back to the beginnings of Ayruvedic practices. See Nutraceuticals (Appendix 2 – Nutraceuticals Overview).

Azeotrope – A mixture of two volatile substances, which when combined, usually evaporate at a different temperature than either of the two would evaporate singly. This occurs until conditions are changed (like pressure) or until one of the ingredients is used up. Azeotroping of two volatile flavoring materials could at least partially explain the concept of the masking effect of flavoring materials. It explains why a simple distillation of fermented ethyl alcohol will yield a 95% (190 proof) mixture with water. See Distillation.

Azuki Bean – See Adzuki Bean.

Azulenes – Complex molecules that contribute coloration to essential oils such as chamomile. The azulene found in chamomile is called chamazulene, and in vetiver, vetivazulene, in guaiacwood, guaiazulene and so on. See Chamomile.