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Review Article

# A Review on Natural and Synthetic Food Flavors

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## Abstract

This work is on natural, synthetic and derived food flavours, their origin, influenced from natural and synthetic flavouring; chemical material matrixes that make up flavour compound, their applications as well as identifying or measuring food flavours. The aroma and taste of food has many functions, conveying aesthetics of food, detection, activating appetites and psychological feelings. Food flavour compounds could be volatile derived, or they could be natural or the combination of the two, evidenced via perceptible neurons. The senses detect and recognize thousands of different aromas that can potentially arise from non-volatile and volatile compounds that are naturally and synthetically impacted or derived. These chemical or energy substances confers satiation and dis-satiation to consumers. Hence the hunger for much food or less which could influence a state of health of an individual.

***Keywords:*** *Flavours; Natural; Derived; Food; Compound; Satisfaction*

## Introduction

Food served today comes with varietal aromas, taste, colour and shapes and these characteristics or combinations of these characteristic confer satiety, health, safety and unsafe situation about food at our dispersal. Lower animals are attracted to their food based on sensorial appeal of taste, smells or colours**.** Aromas, however, represent an extreme heterogeneous biomolecule due to sources and chemical structures of foods. The term aroma is an integral perception of all the senses of smell, taste, sight, touch but flavour designates all the organolepticity of tasting UNE [1]. The sensory characteristics of food represent only an infraction of the phenomena recognized by the individual when the food is ingested. It is not clear why food sensory characteristics coexist with aroma, texture, and appearance Lyon [2]. Intuitively, it is suggested that the aroma is perceived as an integrated phenomenon of flavor or sensory complex Lyon [2].

In defining flavor, we resort to description of its effects however, reactivity amplifies by our senses of taste, smell, touch, and even sight. Flavouring agents are known chemical biostructures, that gives specific and wide taste impressions, which influences our taste receptors on food and food related substances. The volatile part contains both taste and odour substances, while the non-volatile part contains taste substances only. The volatile part contains organic derivatives. The aim of this review work is to elucidate the chemistry of natural and synthetic flavor and enlighten food vendors and consumers about tactile sensation, via taste appeals from food helping them demarcate possibly natural and synthetic flavours as well as sources, health and applications in daily food process and use.

### The origin and effects of natural and synthetic flavours

A study of the structures typical of flavours has oriental shape of the molecule which is of great importance which fits to the molecular orient of receptors nerve endings in the nose, which stimulates electrical impulses that goes over the sensory nerves to the brain and give

corresponding impression of the substance [3]. Chemical studies on fruit flavours are concerned on the volatile materials. Volatile material release via secondary changes such are caused by heating or enzymatic reactions on food surfaces or on food matrixes result eventually to synthetic flavor compounds. Plant contains valorizable constituents, and this is what gives them flowing aroma and odour, but the non-volatile constituents are usually inert, coupled with a physiological satiety [3]. The intensity and quality of volatiles and non-volatiles sometimes defines food plant s Josh [3].

## Natural flavours

Natural flavours are typical complex mixtures of chemicals from plants and animals or fruits. In many instances flavours chemical varies and these bio mixture gives natural extracts rich and complex flavour. Thus, the predominant chemical flavour that could be identified by sense of taste or smell are natural extract and sometime synthetic flavour substances too.

**Natural flavor concentrate**: Some Concentrate preparations are obtained exclusively by physical methods from natural raw materials examples are essential oils, oleoresins, extracts and plant or animal distillates.

| Flavour Types | Examples |
|---|---|
| **1. Fruit flavour** | |
| I. Citrus-type flavor | Grapefruit, orange |
| ii. Berry-type flavour | Apple, raspberry, banana |
| **2.Vegetable flavours** | Lettuce, celery |
| **3. Spice flavor** | |
| i. Aromatic | Cinnamon, peppermint |
| ii. Lachrymogenic | Onion, garlic |
| iii. Hot | Pepper. ginger |
| **4. Beverage flavour** | |
| i. Unfermented flavour | Juices, milk |
| ii. Fermented flavour | Wine, beer, tea |
| iii. Compound flavour | Soft drink |

***Table 1:*** *Natural food flavours.*

*Source: [3].*

## Natural flavor in food material matrixes

### Coffee flavor

Coffee aroma; chemical compounds: 2-furfurylthiol (roasted coffee), β-damascenone (honey-like, fruity), 3-mercapto 3methylbutylformate (catty, roasty), guaiacol (smoky

### Acidity

**Chemical compound:** Aliphatic/alicyclic carboxylic, phenolic acids, chlorogenic acids.

### Bitterness

**Chemical compound:** Caffeine/chlorogenic acids, dicaffeoylquinic acids, phenolics.

### Derived or artificial flavors

By contrast, an artificial flavor could be synthesized or derived from processing which could also come from chemicals constituents rather than being extracted from a natural source. Artificial flavours contain some time natural derivatives flavour but not all due to effects of processing. They may also not be precisely duplicated from complex flavor mixtures due to volatility from processing effects. So, by tasting artificial flavoured food, principal flavor may seem bland or taste like with somehow characteristic flavor. Some essential oils could be used directly as starting materials in the production of flavour or fragrance. However, some essential oils are fractionated or concentrated by distillation, partitioning, or adsorption processes. Odour and taste from flavoured materials are usually concentrated. During the concentration process unpleasant or very faint odours, are removed. Similarly, distillation or crystallization can be used to concentrate and remove unpleasant material from flavours, for instances, eugenol from clove oil which are starting raw materials.

### Derived flavours

**Phenols:** Phenols are particularly odour-active compounds. However, the more complex phenols have more desirable aroma characteristics. The methoxyphenols are described with many terms; for example, 4-methylguaiacol is described as sweet, candy, vanilla, leather, spicy and smoky, whereas 4-ethylguaiacol and 4-vinylguaiacol have a similar range of descriptors but also include a meaty bacon character.

### Derived flavors from sulphur compound

**Sulphides:** The simple sulphides (dimethyl sulphide, dimethyl disulphide, dimethyl trisulfide and the parent thiol (methanethiol) make an important contribution to cooking aromas, even though individually their aromas are objectionable and sulphurous. Dimethyl sulphide is important for fruit flavours, but also at certain concentrations gives the smell of the sea as well as sweet corn and asparagus aromas.

**Thiophenes**: These sulphur-heterocycles are formed during thermal processing, particularly when is unremarkable, often described as sulphurous and is generally not very potent which has a roasted meat character and has been found in sesame seeds. Aroma, whereas thiophene methanol.

**Thiazoles and thiazolinos**: Also formed during the Maillard reaction, thiazoles tend to give cooked, roasted and toasty notes. Many substituted thiazoles have been seen in cooked food and potatoes [11], but the thiazole that appears most frequently is 2-acetylthiazole. A nutty, roasted, and popcorn aroma, and the related compound, 2-acetyl-2-thiazoline in them has a lower threshold and the aroma of freshly baked bread.

**Isothiocyanates**: Are hydrolysis of glucosinolates, a secondary plant metabolite. The breakdown products can include isothiocyanates and thiocyanates as well as nitriles and epithionitriles, depending on the reaction conditions. It is the biomaterials that are known to give both the pungent aromas and the beneficial bioactive effects. In cauliflower, allyl isothiocyanate was found to be a key odorant, contributing pungent, black mustard-like notes [5]. two isothiocyanates and a thionitrile were noted to be abundant odour-active compounds (4-methylthiobutyl isothiocyanate, 5-methylthiopentyl isothiocyanate and 5-methylthiopentanenitrile.

### Methods of identifying or measuring flavours

One of the challenges facing flavor chemists is determining which of the many thousands of volatile compounds contribute to the aroma profile of the food. Human Sens organs and machine could be uses as olfactometry or sensory analysis which are less an accurate

quantification method like the gas chromatography. Similarly, sensomics approach could be used for the determination of odour-active components in a complex food extract.

| Food (Vegetable/Fruits) | Characteristic flavours' compound |
|---|---|
| Vegetables | Methional |
| Potato | 2-Methoxy-3-isobutylpyrazine |
| Bell pepper | Hexanal |
| Green beans | (E,Z)-2,6-Nonadienal |
| Cucumber | 1-Octen-3-ol |
| Mushroom | 5-Methylthiopentanenitrile |
| Broccoli, cabbage | 2,4-Dithiapentane |
| Truffle oil Fruits | 4-(4-Hydroxyphenyl) butan-2-one |
| Raspberry | (Raspberry ketone) 3-Methylbutyl acetate |
| Pear drops | Allyl hexanoate |
| Pineapple | γ-Decalactone (4-decanolide) |

***Table 2:*** *Character flavour compounds in fruits and vegetables.*

*Source: [3].*

| Cereals/grains/animal foods | Flavour compounds |
|---|---|
| Cooked rice, popcorn | 2-Acetyl-1-pyrroline |
| Bread crust | 6-Acetyl-1,2,3,4-tetrahydropyridine |
| Corn tortilla | 2-Methylimino-3-butanone |
| Meat/cooked meat | 2-Methyl-3-furanthiol |
| Beef tallow | 12-Methyltridecanal |
| Aged prime rib of beef | Bis-(2-methyl-3-furan) disulphide |
| Sheep meat | 4-Methyloctanoic acid |
| Vanillin, Vanilla | 4-Hydroxy-3-methoxybenzaldehyde |
| Roast chicken | (E,E)-2,4-Decadienal |

***Table 3:*** *Character flavour compounds cereals and animal foods.*

*Source: [3].*

## Odour level

A threshold concentration is defined as the concentration at which an individual first perceives the stimulus. Aroma has a detection threshold - the point at which the individual can sense an aroma, or a recognition threshold - the point at which an individual can recognize the aroma. Since aroma thresholds can vary by several orders of magnitude, odour levels are normally determined for several assessors, and the value quoted is the concentration at which half the assessors can perceive the aroma.

## Recombinants

The dilution factor (FD) and the odour-activity value (OAV) gives a different but complementary information. The way of removal of each compound from the recombinants, those compounds that truly have an impact on the aroma profile can be determined. Also, frac-

tional changes in concentration can be assessed to give an idea of the tolerance of the aroma to small changes in the concentration of each volatile. In real terms, this exercise indicates which of the volatile components are worth targeting for flavour optimization.

### Flavour impacting compounds

The volatile profile of most foods contains many aromatic-active compounds but very in dishing out aesthetic character to the food. For example, broiling meat [17], many of which impart matrixes of aromatic notes that are important for meat perceptions. Others impart seemingly unrelated aromas such especially from plants. There are only a few compounds that impart a characteristic meaty aroma, the most common examples are 2-methyl-3-furanthiol and bis-(2-methyl-3-furan) disulphide. This is called the 'character impact compounds' of meat because without these, the food would be unrecognizable. The 2-methyl-3-furanthiol gives a generic meaty note to all meats, and species character is given by other character impact compounds. Not all foods have character impact compounds; their unique character may be attributed to a combination of aroma compounds. Win impact character compound, for example, although individual wines do contain some very recognizable aromas.

### Application and significance of flavour in food systems:

- **Cultural aspects:** Food (flavor) acceptance is linked to cultural and life experiences (learned cues).
- **Emotional Aroma** perceptions are linked to memory and emotions.
- **Nutritional:** Flavour is an important determinant of food acceptance and diet and impact flavor attributes (aromatics) to formulated products that lack flavor.

## Conclusion

Food flavor either natural or synthetic and their presence in some foods are complex and are also responsible for the conferred properties of many foods, especially when having to design new food products. It is important to take into consideration food flavour either natural or synthetic because they confers certain characteristics on food defining their physical and chemical properties and behaviours. These are important as aesthetic therapy to suit the organic and physical aspect of the food.

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