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Review Article

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Food Chemistry

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Abstract Food chemistry is the study of the chemical processes and interactions of all biological and non-biological components of foods. The biological components typically include meat, poultry, lettuce, beer and milk. Food chemistry covers issues including nutrition and sustainability within the context of knowledge on food components. This paper provides a brief introduction on food chemistry.

Keywords food chemistry, food safety, food technology

Introduction

Food is a major concern throughout the world. Chemistry is the study of the composition and properties of materials and the changes they go through. Chemistry is part and parcel of our everyday life. Almost everything we do directly or indirectly involves chemistry.

Food chemistry deals with the composition and properties of food and the chemical changes it undergoes during handling, processing, and storage. The chemical composition of foods is essential in the study of their properties, processing applications, and quality control.

A major subject in food science, food chemistry is the study of the properties of foods and their ingredients. It deals with the essential nutritional factors that determine the nutritional value of foods. Its goal is understanding how chemical systems behave in order to better control them and improve their nutritional value. It seeks to understand the relationship between molecular structure and function for food proteins, carbohydrates, and lipids. Its main components include carbohydrates, lipids, proteins, water, vitamins, minerals, enzymes, food additives, flavors, and colors [1].

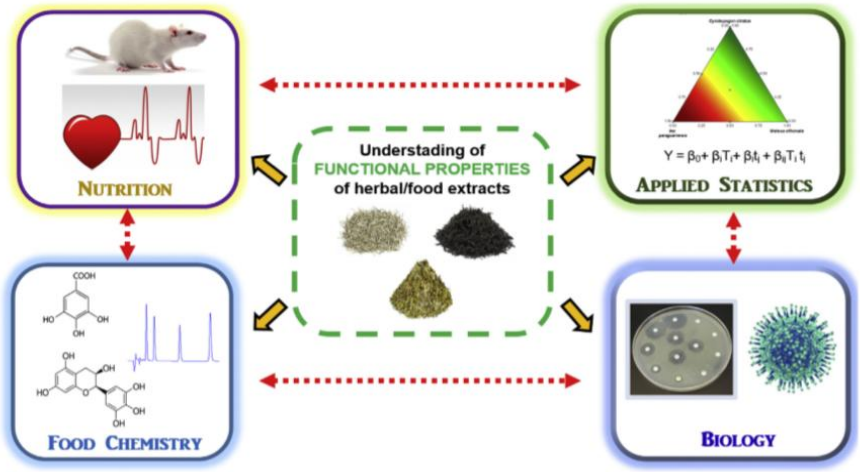

Figure 1: Relationship of food chemistry and other disciplines [2]

Food Chemistry Concepts

Food chemistry concepts are often drawn from different disciplines such as chemistry, biochemistry, biology, nutrition, pharmacology, rheology, and thermodynamics. The relationship of food chemistry and other disciplines is shown in Figure 1 [2]. The food chemist relies on knowledge of these disciplines to study and control biological substances as sources of human food. In order to solve problems related to food processing and storage, food chemists must be able to integrate information about quality attributes of foods with the deteriorative reactions to which foods are susceptible.

Food chemistry emerged as a disciple after the second World War. It covers various food-related issues such as interactions between ingredients, processing operations on food components, eating habits, and health effects on food components. Its objective is to ensure a supply of food that is safe, affordable, and nutritious [3].

Safety is the first requisite of any food. As food is very basic to human existence, food safety is crucial to sound health. Safe food refers to food prepared on clean and sanitized surroundings with clean utensils and dishes. Millions of people worldwide are hospitalized every year and many die due to consumption of contaminated food. Due to customers' increasing demand for better quality food, the issues of food safety are becoming important worldwide. Food safety is a public health issue which has become a global problem [4].

Food Components

Food components include macro constituents (such as water, proteins, carbohydrates) and micro constituents (such as vitamins, minerals, flavors, additives). Food chemistry seeks to study the chemistry of these food constituents.

Water is a major component of food. One way to preserve food is to reduce the amount of water. This is achieved by many methods such dehydration, freezing, and refrigeration. The volume of bottled water consumption has passed that of alcoholic beverages.

Protein in food is essential for growth and survival. It is commonly obtained from animal sources such as eggs, milk, and meat or vegetable sources such as nuts, grains, and legumes. Although meat is the preferred form of protein for human consumption, raising animals is expensive from environmental viewpoint [5].

Vitamins in food are required in small amounts for essential metabolic reactions in the body. Having an sufficient supply of vitamins can prevent some diseases.

Enzymes are catalysts that are used in converting processes from one substance to another. They are used in baking, brewing, dairy, and making cheese, beer, and bread.

Minerals in foods include calcium, magnesium, potassium, copper, iron, and zinc. These are found in many foods, but can also be taken as dietary supplements.

In addition to these, we have food coloring, food additives, and food flavor. Undesired compounds, which contaminate foodstuffs, are formed mostly during food processing. Green label, green approaches, and what the consumer perceive as healthy food are the drivers of the food industry. The kosher and halal food regulations govern the food requirements of practicing Jews and Muslims. Food companies and food service providers must meet these regulations in order to serve these markets.

Conclusion

Food chemistry is the application of chemistry principles to food systems, including food production, processing, transportation, storage, distribution, and consumption [6].

It covers various areas including functional foods, organic and genetically modified foods, and nonthermal food processing. Because food matters impinge on the general welfare of the public, food chemists should be responsible to have their activities directed to the benefit of society and guard the ethics of the scientific community.

More information about food chemistry can be found in several books available on Amazon.com including those in [3, 7-14] and in the several journals devoted to it: *Food Chemistry, Journal of Agricultural and Food Chemistry, Journal of Experimental Food Chemistry, Journal of Nutrition & Food Sciences, Journal of Food Chemistry and Nutrition,* and *Journal of Food Chemistry & Nanotechnology,*

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