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SENSORY EVALUATION VS INSTRUMENTAL EVALUATION OF FOOD:

INSTRUMENTAL EVALUATION OF FOOD:

The instrumental analysis of foods is an important step in food processing and manufacturing companies because of the presence and interactions of various compounds in foods during storage and processing. While traditional methods are still used, most analysis involves the use of different instruments. Modern analytical chemistry is “the qualitative and quantitative characterization of matter”, which generally requires a small sample using different instruments. Qualitative analysis is the identification of one or more chemical species present in a material, whereas quantitative analysis is the determination of the exact amount of a chemical species present in a sample. Separations can be achieved with selective qualitative and quantitative methods. Instrumental methods are carried out with specially designed electronic instruments controlled by computers and are used for the interaction of electromagnetic radiation and matter, the determination of some physical properties of matter, and characterization of the sample being analyzed. These instruments have automated sample introduction, automated data processing, and even automated sample preparation. The most suitable instrumental technique

depends on the physico-chemical characteristics of the analyte, the detection limit, and the chromatographic resolution required.

Accurate determination of components, residues, and contaminants in food is important to ensure both the quality and safety of products for consumers. Methods of analysis have to be robust and accurate; however, the time spent on sample preparation must be decreased and more environmentally friendly techniques must be used, such as using smaller volumes of organic solvents. Food products are complex mixtures of vitamins, sugars, proteins and lipids, fibers, aromas, pigments, antioxidants, and other organic and mineral compounds. Before such substances can be analyzed, they have to be extracted from the food matrix using different methods. The instruments used to perform these extractions are classified into the following areas: spectroscopic methods, chromatographic methods, and the electrophoretic method. Spectroscopic techniques involve the visible region, ultraviolet (UV) region, the near-infrared (NIR) region, mid-infrared (MIR), Fourier transform infrared (FT-IR), atomic spectroscopy, etc. Chromatographic methods are commonly defined as gas, liquid, supercritical fluid, paper, thin-layer chromatography (TLC), etc. Hyphenated chromatographic methods have also now been developed. The final instrumental method is electrophoretic analysis, classified as conventional and capillary electrophoresis (CE).

Some of the techniques used in instrumental analysis of food are explained below:

ELECTROPHORESIS:

Electrophoresis is based on the differential migration of charged components in an electric field. The basic requirements of electrophoresis are a semi-conducting medium and an electric field. The semi-conducting medium can be a paper soaked in an electrolyte or a gel placed in an electrolyte.

CHROMATOGRAPHY:

Chromatography is essentially a physical method of separation. The separated components are distributed between two phases: the stationary phase and mobile phase. Chromatographic separations have three features: they are physical methods of separation; two distinct phases are involved; and separation occurs with differences in the distribution constants of the individual sample components between the two phases. What is important is that either the rate of migration or direction of migration of the two phases are different. A

convenient classification of chromatographic techniques can be made in terms of the physical state of the phases employed for the separation. When the mobile phase is a gas and the stationary phase a solid or liquid, the separation techniques are known as gas-solid chromatography (GSC) or gas-liquid chromatography (GLC), respectively.

SPECTROSCOPY:

The range of wavelengths from 350 to 700 nm is known as the visible region of the spectrum. While UV radiation is defined from 200 to 350 nm, the NIR region starts immediately at 750 nm and ranges up to 2,500 nm. The classical infrared (IR) region extends from 2,500 to 50,000 nm. The energies of IR radiation range are not sufficient to cause electron transitions, but they do cause vibrational changes within molecules.

SENSORY EVALUATION OF FOOD:

Sensory evaluation has been defined as a scientific discipline used to evoke, measure, analyze, and interpret human reactions to meat sensory characteristics as perceived by sight, smell, taste, touch, and hearing by the Institute of Food Technologists (IFT). Sensory evaluation is an essential component of a food research project or product development. The Sensory Division of the Institute of Food Technologists (IFT, 1981b) defines sensory evaluation as "A scientific discipline used to evoke, measure, analyze, and interpret reactions to those characteristics of foods and materials as they are perceived by the senses of sight, smell, taste, touch, and hearing." Sensory evaluation tests may be used in product development, research, quality control, and shelf-life studies. In each of these applications, sensory evaluation data may be used as the basis for decision-making. Several factors must be controlled in conducting a sensory evaluation test to minimize experimental error in the data. Sensory tests may be divided into three groups based on the type of information that they provide. The three types are discrimination, descriptive, and affective. Sensory evaluation involves the development and use of principles and methods for measuring human responses to food. The science of sensory evaluation relies on guidelines for the preparation and serving of samples under controlled conditions so that biasing factors are minimized. Sensory evaluation is a quantitative science in which numerical data are collected to determine specific relationships between product characteristics and human perception.

Sensory evaluation plays a major role not only in the quality control of manufactured products, but also in the development of new products. To perform sensory evaluations, the opinion of people with different levels of training and experience is sought. One level of evaluators are untrained people, such as customers in a supermarket, who are given samples of food and are asked either for their “overall” impression or to describe what they like or dislike about the food that they are tasting. Another type of evaluator are people who have had some specific training in sensorial evaluation of food. Finally, there are professional evaluators who are highly trained specialists, who over time quite often develop an exceptional knowledge of products in terms of their desired texture, consistency, and visual appearance as well as flavor and taste. To perform a sensory evaluation correctly requires knowledge of statistical mathematics and matters such as correlations, levels of reliability, and levels of significance have to be taken into account.