

1. Introduction to Food Analysis

Introduction :-

- Investigation of Food science and technology, whether by the Food industry, governmental agencies or universities, often require determination of Food composition and characteristics.
- In addition, analysis is done of a problem sample and competitor's products.
- the characteristics of food. (i.e. chemical composition, physical properties, sensory properties) are used to answer specific que. of regulatory purpose and typical quality control.
- the nature of the sample and specific reason for the analysis commonly dictate the choice of analytical method.

Trends and Demands :- By consumers :-

- Consumers have many choice regarding their Food supply, so they can be very selective about the product the purchase.
- consumers are concerned about the safety of the food, which has increased the testing of food for allergens, pesticide residue, and Product for genetic modification of food materials.
- for example - The demand for Foods with lower fat content has challenged food scientists to develop food product that contain fat content claims (e.g. free low, reduced) and certain health claims.
- Analytical method to determine and characterize fat content provide the data necessary to justify these statements and claims.

Trends and Demands : By Food Industry :

- To compete in the marketplace, Food Companies must produce foods that meet the demand of consumers as described previously.
- Analytical methods must be applied across the entire food supply chain to achieve the desired final product quality.
- Companies increasingly rely on others to supply high-quality and safe raw ingredients and packaging materials.
- These specifications, and the associated tests, target various chemical, physical and microbiological properties.
- Results of these analytical tests related to the predetermined specifications delivered as a Certificate of Analysis (COA) with the ingredient / Raw material.

Type of samples analysed

Sample type	Critical questions
1] Raw materials	i) Do they meet your specifications? ii) Do they meet required legal specifications? iii) Are they safe authentic?
2] process control	i) Did a specific processing step result in a product of acceptable samples composition or characteristics?

handling includes important statistical principles.

* choice and validity of Method:

At characteristics of the Method

Table No. 1

criteria for choice of Food Analysis

characteristics properties

critical questions

i) specificity / selectivity

i) If the property being measured the same as that claimed to be measured, and it is the only property being measured are?

ii) Are there interference?

iii) What steps are being taken to ensure the high degree of specificity?

ii) precision

i) what is precision of the method

ii) Is there within-batch, batch-to-batch or day to day variation?

iii) What step in the procedure contributes the greatest variability?

iii) Accuracy

i) How does the new method compare in accuracy the old standard method?

ii) what is percent recovery?

Aplicability of method to laboratory :-

Characteristics properties

Critical questions.

1] Sample size

- i) How much Sample is needed?
- ii) it is too large or too small to fit your needs?
- iii) Can you obtain representative sample?

iv)

2] Reagent:

- i) Can you properly prepare them?
- ii) Are they stable?
- iii) Is the method very sensitive to slight or moderate changes in the reagents?

iv)

3] Equipment

- i) What is equipment needed?
- ii) Do you have the appropriate equipment.
- iii) Are personnel competent to operate equipment?

4] cost

- i) What is cost in terms of equipment, reagent & personnel?

B] objective of the Assay :-

- selection of a method depends largely on the objective of the measurement.
- method referred to as reference, definitive, official or primary are most applicable in a well-equipped and staffed analytical lab.

- The more rapid secondary or field methods may be more applicable on the manufacturing floor in food processing facility.
- For e.g. refractive index may be used as a rapid secondary method for sugar analysis to with result correlated to those of the primary method, HPLC.

c] consid consideration of food composition :-

- proximate analysis of foods refers to determining the major component of moisture, ash (total minerals), lipids, proteins and carbohydrate.
- the performance of many analytical methods is affected by the food matrix (i.e. its major chemical components.)
- In food analysis, it is usually the food matrix that presents the greatest challenges to the analyst.
- For example - high-fat or high-sugar foods can cause different type of interference than low-fat or low-sugar foods.
- Another example - using matrix-dependent methods one method might be applied to potato chips and chocolates, both of which are low-protein, medium-fat, medium-carbohydrate foods, the another might be required for a high-protein, low-fat high carbohydrate food such nonfat dry milk.

* Validity of Method:-

- Numerous methods affect the usefulness and validity of the data obtained using a specific analytical method.
- One must consider certain characteristics of any method, such as specificity, precision, accuracy and sensitivity.
- One must consider the nature of the samples collected for the analysis, how representative the samples were of the whole and the number of samples analyzed.
- One must ask whether details of the analytical procedure were followed adequately, such that the results are accurate, repeatable and comparable to data collected previously.
- For data to be valid, equipment to conduct the analysis must be standardized and appropriately used and the performance limitations of the equipment must be recognized.

* Official Method

The choice of the method for specific characteristics of a component of a food sample is often made easier by the availability of official methods. Several non-profit scientific organizations have compiled and published these methods of analysis of the food product which have been carefully developed and standardized. They allow for comparability of results between different laboratories that follow the same procedure, and for evaluating results obtained using new or more rapid procedures.

1) AOAC International :-

AOAC International is an organization begun in 1884 to serve the analytical methods to need of government regulatory and research agencies. The goal of AOAC International is to provide method that will be fit for their intended purpose. (i.e. will perform with the necessary accuracy and precision. usual laboratory conditions.)

This voluntary volunteer organization function as follows :-

- 1) Method of analysis from published literature are selected or new method are developed by AOAC International volunteer.
- 2) method are collaboratively tested using multi laboratory studies in volunteer's laboratories.
- 3) method are given a multilevel peer review by expert scientists and if found acceptable, they are adopted as official method of analysis.
- 4) Adopted method are published in the official methods of Analysis, which covers a wide variety of assay related to food, drugs, cosmetics, agriculture, forensic science and product affecting public health and welfare.
- 5) AOAC International publishes manuals, methods compilations in specific area of analysis, monographs, and the monthly magazine Inside Laboratory Management.
- 6) AOAC International conduct training courses of interest to analytical scientists and other laboratory personnel.

2) other Endorsed methods:-

- The AACC International publishes a set of approved laboratory methods, applicable mostly to cereal products (e.g. baking quality, gluten, physical dough tests, staleness / texture).
- The AACC International process of adopting the Approved method of Analysis is consistent with the process used by AOAC International and AOCs. Approved methods of the AACC International are continuously reviewed, critiqued, and updated and are available online.
- The AOCs published a set of official methods and recommended practices, applicable mostly to Fat and oil Analysis (e.g. vegetable oils, glycerol, lecithin,) AOCs is widely used methodology source on the subjects of edible and oils, oilseeds, and oilseeded proteins, soaps and synthetic detergent, industrial fats, oil, fatty acids, glycerin and lecithin.