Preparation of Laboratory Food Samples

Aims

- Food pretreatment for analysis
- Preventing Changes in Sample
- Sample Identification
- Sources of Experimental Error

Sample preparation

- The food material is usually **heterogeneous**
- It is usually necessary to make samples **homogeneous** before they are analyzed
- the variability in composition of a single food sample can be **minimized** with proper sampling and sample pretreatment techniques.
- **Advances in sample preparation** aim to minimize laboratory solvent use and hazardous waste production, save employee labor and time, and reduce the cost per sample, while improving the efficiency of the analyte isolation.

1-FOOD PRETREATMENT

- It is often necessary to wash, remove, or drain irrelevant extraneous matter.

- **Examples**: Soil or sand that adheres to fresh fruit or vegetables can be removed by washing or wiping the surface of the produce
- Removing the skin of a fruit
- Meat is removed as completely as possible from bone.
- Eggs are broken to isolate the liquid interior,

1-FOOD PRETREATMENT

- a suitable method is then required to make the material **less heterogeneous**.
- **Homogenization** can be achieved using **mechanical devices** (e.g., grinders, mixers, slicers, blenders), **enzymatic methods** (e.g., proteases, cellulases, lipases) or **chemical methods** (e.g., strong acids, strong bases, detergents).
- The type used depends on the properties of the food being analyzed (e.g., solid, semi-solid, liquid).

1-FOOD PRETREATMENT

- The analyses of **liquid food samples** have an advantage over those associated with solid samples in that they usually require one less pretreatment step, due to their liquid form.

- Straightforward techniques that may used to prepare liquid samples prior to the analysis step include sample dilution, evaporation, microdialysis, or liquid-liquid extraction

2-Preventing Changes in Sample

- Once we have selected our sample we have to ensure that it does not undergo any significant changes in its properties from the moment of sampling to the time when the actual analysis is carried out, e.g., enzymatic, chemical, microbial or physical changes.
- There are a number of ways these changes can be prevented.

Enzymatic Inactivation

-Freezing,

-Drying,

-Chemical preservatives (or a combination)

with the method used depending on the type of food being

analyzed and the purpose of the analysis.

Lipid Protection

store samples that have high unsaturated lipid contents under nitrogen or some other inert gas,

In dark rooms covered bottles and In refrigerated temperatures.

antioxidants may be added to retard oxidation.

Microbial Growth and Contamination

Freezing,

drying, heat treatment and chemical preservatives (or a combination)

Physical Changes

Physical changes can be minimized by

controlling the **temperature** of the sample, and the forces that it experiences.

Sample Identification

- Laboratory samples should always be labeled carefully so that if any problem develops its origin can easily be identified.

- **The information used to identify a sample includes:**

  a) Sample description,

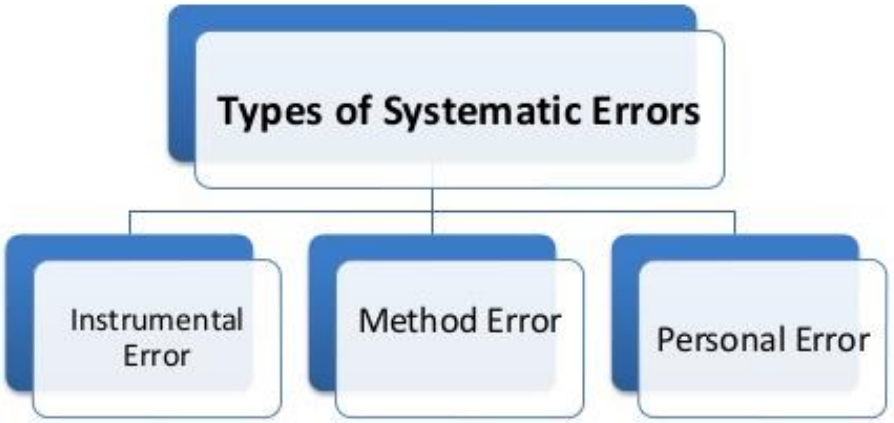
  b) Time sample was taken,

  c) Location sample was taken from,

  d) Person who took the sample

- The analyst should always keep a detailed **notebook** clearly documenting the sample selection and preparation procedures performed and recording the results of any analytical procedures carried out on each sample.

Sources of Experimental Error



Personal Errors (Blunders)

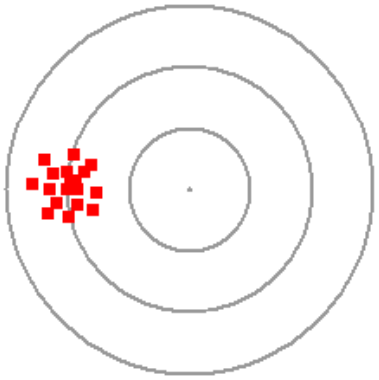
- These occur **when the analytical test is not carried out correctly**
- The **wrong chemical reagent** or equipment might have been used;
- Blunders are usually easy to identify and can be eliminated by carrying out the analytical method again more carefully.

Random Errors

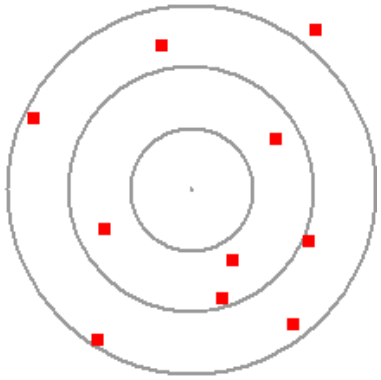
- These produce data that vary in a non-reproducible fashion from one measurement to the next e.g., **instrumental noise**. This type of error determines the standard deviation of a measurement. There may be a number of different sources of random error and these are accumulative

Systematic Errors

- A systematic error produces results that consistently deviate from the true answer in some systematic way,
- **e.g., measurements may always be 10% too high**. This type of error would occur if the volume of a pipette was different from the stipulated value.
- Systematic errors are difficult to detect and cannot be analyzed statistically,



Systematic Error



Random Error