2.2 VARIOUS QUALITY ATTRIBUTES OF CHEMICAL AND MICROBIAL QUALITY CONTROL

1.Chemical Quality Control:

a.Pesticide Residues:

Attribute: Presence of pesticides in food products.

Control Methods: Analytical techniques such as gas chromatography (GC) or liquid chromatography (LC) coupled with mass spectrometry (MS) for detection and quantification.

b.Heavy Metals:

Attribute: Presence of toxic heavy metals (e.g., lead, cadmium, mercury).

Control Methods: Atomic absorption spectrometry (AAS), inductively coupled plasma mass spectrometry (ICP-MS) for precise measurement and monitoring.

c.Additives:

Attribute: Presence and permissible levels of food additives (e.g., preservatives, colorants, flavor enhancers).

Control Methods: Chromatographic techniques (e.g., HPLC, GC), spectroscopic methods (e.g., UV-Vis), and chemical assays.

d.Nutritional Components:

Attribute: Levels of nutrients (e.g., vitamins, minerals) essential for health.

Control Methods: Chemical assays (e.g., titration, colorimetry), chromatographic techniques (e.g., HPLC), and spectroscopic methods (e.g., atomic absorption spectroscopy).

e.Allergens:

Attribute: Presence of allergenic proteins (e.g., gluten, peanuts, soy) that can trigger allergic reactions.

Control Methods: ELISA (enzyme-linked immunosorbent assay) and PCR (polymerase chain reaction) for allergen detection.

2.Microbial Quality Control:

a.Total Plate Count:

Attribute: Total viable microbial count indicating overall microbial load.

Control Methods: Standard microbiological plating methods using selective and differential media.

b.Specific Pathogens:

Attribute: Presence of pathogenic microorganisms (e.g., Salmonella, Listeria monocytogenes, E. coli).

Control Methods: Molecular techniques such as PCR, immunological assays (e.g., ELISA), and selective enrichment followed by plating.

c.Yeast and Mold Count:

Attribute: Presence of fungi indicating spoilage and potential mycotoxin production.

Control Methods: Yeast and mold enumeration using agar plates and selective media.

d.Indicator Organisms:

Attribute: Presence of indicator organisms (e.g., coliforms, Enterobacteriaceae) indicating sanitation and hygiene levels.

Control Methods: Membrane filtration, multiple-tube fermentation, and chromogenic or fluorogenic media.

e.Implementation and Regulatory Compliance:

Sampling Protocols: Ensure representative sampling and proper handling to avoid contamination.

Testing Methods: Use validated methods and equipment calibrated to standards.

Data Interpretation: Compare results against regulatory limits and internal quality standards.

Corrective Actions: Implement measures (e.g., sanitation, process adjustments) based on results to maintain safety and quality.