

Sulphur dioxide Estimation by Modified Monier – Williams Apparatus

Reagents Required:-

- 1) 3% Hydrogen peroxide
- 2) 0.25% Methyl red indicator
- 3) 0.1N Pot. Permanganate
- 4) 1:2 Hydrochloric acid
- 5) 0.1N Sod. Hydroxide soln.

Procedure :-

- 1) Assemble as shown in the figure.
- 2) Take 40ml of neutralized Hydrogen peroxide soln. in each U- tubes.
- 3) Place 100gm of sample (homogenized) in 3 necked flasks.
- 4) Add 75ml of 1:2 HCl
- 5) Add 325ml DW.
- 6) Start water flow and gas flow.
- 7) Then switch on heater. Reflux the sample for 30 min.
- 8) Sulphur dioxide in the sample gets entrapped in hydrogen peroxide in U-tubes
- 9) Remove and transfer into a flask and titrate against 0.1N NaOH.

Calculation:- 1 ml of 0.1N NaOH = 3.203 mg of SO₂

13. AN INTRODUCTION TO HACCP CONCEPT IN SEAFOOD INDUSTRY

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On December 18, 1995, The Food and Drug Administration (FDA) published as a final rule 21 CFR 123, "Procedures for the Safe and Sanitary Processing and Importing of Fish and Fishery Products" that requires processors of fish and fishery products to develop and implement Hazard Analysis Critical Control Point (HACCP) systems for their operations. The regulation became effective December 18, 1997.

Hazard Analysis and Critical Control Point (HACCP) system is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product. In other words, HACCP is applied throughout the food chain from primary production to final consumption and its implementation should be guided by scientific evidence of risks to human health. Hence, HACCP is the application of common sense and scientific principles to food preparation. Apart from enhanced food safety, implementation of HACCP can provide other significant benefits. One of the advantages of HACCP programme is that it permits lesser destructive sampling than the traditional inspection system. Also, it is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments. Based on the mandatory requirements from the importing countries including USA and European Union, the Expert Inspection Council of India has also formulated HACCP procedure for Indian Seafood Industry and now HACCP has become the guiding principle for Indian Food Industry.

Components of HACCP Plan

There are twelve important components for a HACCP plan/manual. They are

- 1) Quality Policy
- 2) Organisational chart
- 3) Organisational narrative
- 4) HACCP Team, duties and responsibilities of the members
- 5) Description of products and end use
- 6) For each similar product group there should be:
 - a) Process flow chart, Hazard analysis worksheet

Process flow chart

A process flow chart is a schematic and systematic representation of the sequence and interactions of steps involved in a process. Flow charts are needed for the implementation of the quality assurance programme based on HACCP system in a production line. Flow chart should contain all the steps in a production process with sufficient details so that the CCP with respect to each possible hazard can be easily identified. The HACCP worksheet and HACCP plan form are prepared based on process flow-diagrams. A model of flow chart is attached as Annexure 1&II.

HACCP worksheet

The HACCP worksheet addresses the first two principles of HACCP. The worksheet should essentially contain the name and address of the production unit, name of the product, intended use of the product, target consumers and method of storage and distribution.

b) HACCP plan forms for each CCP

Every processor shall have and implement a written HACCP plan whenever a hazard analysis reveals one or more food safety hazards that are likely to occur. The HACCP plan form is a tool which helps to manage each CCPs. The plan form addresses the last five principles of HACCP. A HACCP plan form typically contains 10 columns listing the details of CCPs identified, significant hazards at each CCPs, critical limits, monitoring (such as what, how, frequency and who), corrective actions, records and verification. Like worksheet, plan form also should contain details like name and addresses of the production unit, name of the product, intended use of the product, target consumers and method of storage and distribution. It should be specific to: (1) Each location where fish and fishery products are processed by that processor; and (2) Each kind of fish and fishery product processed by the processor.

- 7) Record keeping procedure
- 8) Good Manufacturing Practices (GMP)
- 9) Sanitation Standard Operating Procedure (SSOP)
- 10) Verification Procedure (HACCP Team)
- 11) Recall Procedure
- 12) Labels/Specifications

The HACCP concepts and the system work based on the seven principles of HACCP. They are

- (1) **Conduct hazard analysis: *List the natural hazards reasonably likely to be associated with the species you process.***

Hazards in seafood may be biological, chemical or physical hazards. These hazards can be introduced both within and outside the processing plant environment, including that can occur before, during, and after harvest. FDA has developed "Fish and Fishery Products Hazards and Control Guide," a guide of species and the hazards normally

associated with them including toxins, microbiological growth, and chemical contamination.

Determine Critical Control Points (CCPs): *At what point can a procedure be applied to prevent, eliminate or reduce the hazard?*

CCP is a step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

- 2) **Determine Critical Limit: *Establish the minimum or maximum limit needed to prevent, eliminate or reduce the hazard to an acceptable level.***

A critical limit is defined as the maximum and minimum value to which physical, biological or chemical parameters must be controlled at a critical point to prevent, eliminate or reduce to an acceptable level the occurrence of the identified food safety hazard.

- 3) **Establish monitoring Procedures: *Establish reliable measuring and frequency of measurements at critical control points.***

This facilitates easy tracking of the operation and used to determine when there is a loss of control and a deviation occurs at a CCP in exceeding or not meeting a critical limit. Apart from that, monitoring provides written documentation for use in verification.

- 4) **Establish corrective actions: *Identify what you will do if any of the critical limits are exceeded or not met***

When the results of monitoring indicate a failure, corrective action must be taken in order to prevent a health hazard.

- 5) **Establish record keeping and documentation: *Most crucial part of HACCP Plan.***

Any record that deals with product safety, test results, process safety, research report, calibration records and inspection records must be approved, signed and dated.

- 6) **Establish verification procedures: *At least once a year, verify that your HACCP plan adequately controls food safety hazards and that it is being implemented effectively.***

This includes initial validation of the HACCP plan, subsequent validation of the HACCP plan and verification of CCP monitoring as described in the plan

Pre-requisite programs for HACCP

Prerequisite programs cover all the activities which interact within and across various processes, that may influence the food safety outcomes of the product. Good manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOP) are the two important prerequisite programs needed for HACCP implementation.

Good Manufacturing Practices (GMP) are the procedures laid down for achieving safety from plant, machinery, personnel and other infrastructure used in the food production. GMP deals mainly with plant facilities, personnel hygiene, sanitary facilities, equipments and utensils, process control, chemical control, pest control etc.

Sanitation Standard Operating Procedures (SSOP) are written procedures that an establishment develops and implements to prevent direct contamination or adulteration of product. In other words, SSOP should describe all the procedures an official establishment will conduct daily, before and during operations, sufficient to prevent direct contamination or adulteration of products. It mainly deals with safety of water, condition and cleanliness of food contact surfaces, prevention of cross contamination, maintenance of hand washing, hand sanitizing and toilet facilities, protection from adulterants, proper labeling, storage and use of toxic compounds, control of employee health, exclusion of pests etc.

The other programs that are needed to have an effective HACCP implementation are product identification, tracking and recall, preventive maintenance, and education and training of employees.

Special Considerations in HACCP Planning

Imports: State how you ensure that any imported products in your processing comply with HACCP regulations.

Biological toxins: State how your processing controls will prevent the development of the biological toxins over your product's shelf life. This is crucial in the case of certain fish species and specialized products such as canned and smoked products.

Harvest area: Explain how you verify that the product is received exclusively from approved waters. This is crucial in the case of filter-feeders such as shellfish.