Introduction
1. INTRODUCTION

The world demand for fish is expected to exceed all available supplies owing to the rapid changes, which take place in the dietary habits of people (Brundaban Sahu et al., 1996). The increasing demand for fish products in domestic and international markets has created a considerable increase in the catch and the use of various methods of treatment, processing and packing to facilitate product transportation from the production site to market centers (Ouaouich, 1997).

Marine products form an important group of commodities exported from India. In recent years, seafood industry has emerged as one of the most important export oriented industries in India. India exports ninety varieties of seafood products to forty five countries all over the world, with Japan, USA and Europe sharing 95% of the total seafood exports (Gopakumar, 1996). India occupies seventh position in the world in terms of fish production and as one of the major fishery products exporter (Rama Mohana Rao, 1999).

All fishes are not acceptable alike, both by domestic and overseas consumers, eventhough the nutritional value of almost all fishes could be the same, aesthetics, taste and popularity of fish determines its price. Since selective sea fishing is impracticable, legitimate utilization of all what is caught would be the bounden duty of man while combating the issues of protein deficiency (Girija et al., 1995).
In many countries in the developing world, the traditional products such as salted, dried, fermented, smoked fish are still an important item of trade (Poonsap Virulhakul, 1995). Marine products are being exported from India also in many forms like dried, pickled, canned and frozen products (Brundaban Sahu et al., 1996). One fifth of India’s fish catch is salted and dried for future consumption in the country and for export to out neighbouring countries. On the processing / preservation side, technologies have been developed for the preparation of several fish based convenience foods making use of many varieties of cheaper fishes. The most important class of value added marine products are the battered and breaded products (Gopakumar, 1996). Cured products enjoy wide popularity in several countries because of their characteristic odour and flavour. Spoilage is inevitable in any food product. Preservation methods only delay spoilage and there is no exception with curing methods. The major quality problems can be prevented by the use of good quality raw material and hygienic processing (Dinesh Kumar et al., 1997).

The current demands of the major market of Japan, USA and Europe motivate the development of Value Added Products (VAP) (Brundaban Sahu et al., 1996). Value addition is the most talked about word in the fish processing industries of these days because of the increased realization of foreign exchange and high unit value of such products (Srinivasa Gopal et al., 1999). Just like in any other food processing industry, seafood, poultry, dairy, vegetables, fruits etc., value-added are the trend of the future (Walter Lee, 1998).
The term value addition refers to the value that is added to a product from the time it enters into the processing plant to the time it leaves or simply, it describes the process, which changes a product’s worth. In order to increase profits, processors of state gradually incorporate low value fish into different processing lines to produce innovative VAP. The end product must of course be quite attractive in the market. VAP are ready to cook, ready to serve, hygienically prepared, nutritious and packed attractively. The advantages are:

a. drastic reduction in time and effort to prepare for the table,
b. avoids thawing, reprocessing and repacking, where taste and flavour of the product is lost

c. offers a wide choice of attractive wholesome nutritious and safe food,
d. it is more profitable compared to more raw material processing and

e. reduction of wastage

A wide variety of VAP both for export and international market based on fish, shrimp, lobsters, squid, cuttle fish, bivalves etc. have been identified (Brundaban Sahu et al., 1996). The value added process is simply and a form of human or mechanical process that alters the entity from its original state or form, in terms of appearance, texture, taste, smell, flavour or sound (Walter Lee, 1998). The VAP take a variety of forms: fillets, steaks, minced products, smoked products etc. consumers prefer easy to prepare, pocketed products to frozen steak or loin (Subasinghe, 1996). Value added products fast gained prominence among consumers, looking for new products coming into the market (Zarko Gorski, 1999).
India has started into value-added processing rather than to remain as a supplier of raw materials to overseas re-processors (Rama Mohana Rao et al., 1999).

Consequent to urbanization, the preference of people has shifted from raw fish to ready to eat fishery products. Consumer acceptance of these products is based largely on their appearance, sensory quality and economic value (Femeena Hassan et al., 1999). Fish mince from low priced fish can be utilized for preparation of cutlet, which has satisfactory frozen shelf life (Joseph Jose et al., 1984).

Keropok or fish cracker, one of the value added products is a popular snack food in Malaysia and in other Asian countries (Yu, 1997). Fish keropok may contain permitted colouring substances and permitted flavour enhancer. Micro-structural studies of keropok during different stages of processing were also observed and correlated to rheological behaviour (Cheow Chong Seng, 1998). Linear expansion of keropok made without wheat starch increased with increasing streaming temperature, but that of keropok made with tapioca starch decreased with increasing steaming temperature and the linear expansion results correlate with the sensory evaluation of the products (Kyaw et al., 2000).

Quality is the keyword for any product or service in the international markets. It is particularly more sensitive in relation to food products. Quality control is extremely important for the export trade. Efforts have been initiated by the government to ensure high quality standards of products for the international markets (Rama Mohana Rao et al., 1999). Quality inspection was initially stated on a voluntary basis but, later it was made compulsory in 1964 by an act of the Parliament (Gokhale, 1995). The
inspection and quality control programmes principle objective is the protection of consumer health (Ouaouich 1997).

Tests to detect spoilage are classified into four main groups of organoleptic, microbiological, physical and chemical tests. The methods applied range from simple sensory evaluation to sophisticated High Pressure Liquid Chromatography (Sally Achaya Subhapolsiri, 1997).

Quality assurance systems provide measures that are needed to ensure product safety (Ouaouich, 1997). Spoilage of any food is attributed to microbial growth due to improper handling and inadequate processing (Michael Antony et al., 2002). Most of the contamination of tropical fish comes from the handling system that is, the ice, the boxes and the boat (Joe Regenstein et al., 1991).

Eventhough the spread of cholerae through fish and fishery products has been negligible, the food borne and water borne disease has affected hundreds and thousands of people around the world (Alan Reilly, 1998). Vibrio species are common in coastal and estuarine environments and numbers can depend on such factors as water depth and tidal levels (Alan Reilly, 1998).

To eliminate or reduce the risk of hazards in the cooking step, a processor should stick to the different quality control measures (Haridas, 1996).

The appeal of biochemical and chemical methods for the evaluation of seafood quality is related to the ability to set quantitative standards. In most cases, sensory methods are useful for identifying products of very good or
poor quality. Thus, biochemical / chemical methods may best be used in resolving issues regarding products of marginal quality. In addition, biochemical / chemical indicators have been used to replace more time consuming microbiological methods.

Total Volatile Basic amines (TVB) is one of the most widely used measurements of seafood quality. It is a general term, which includes the measurement of trimethyl amine, dimethyl amine, ammonia and other volatile basic nitrogenous compounds associated with seafood spoilage. Tri Methyl Amine (TMA) is the normal bacterial breakdown product of TMAO.

Sensory evaluation is a method, which serves as a supporting information to chemical and microbiological analyses (Krissana Sophonphong, 1996). The tools for measurement – our senses of sight, smell, taste and touch are easy to transport and fit anywhere. Results are available almost instantaneously; there is no need to wait for hours or days as in the case of the other methods (Sally Achaya Subhapholsiri, 1997). Sensory evaluation, though not an objective method to assess quality of food, is yet widely used in food inspection worldwide (Krissana Sophonphong, 1996). Sensory evaluation findings are precise and scientific in their own way, if and this is important, if trained sensory analysts (noses) do the testing (Sally Achaya Subhapholsiri, 1997). The flavour of a sample in the mouth should confirm the assessment based on odour, but can give additional information (Anon., 2005).

Sensory assessment is the use of one or more of the five senses to judge or form an opinion on some aspect of quality. The senses in question are sight, smell, taste, touch and hearing. The changes in appearance, smell,
taste and sometimes texture that occur in fish after given intervals of time are described as objectively as possible by a small group of assessors (Anon., 1999). The shelf-life of a (fishery) product is estimated by storing the product, assessing its quality at intervals and deciding at which point it becomes unacceptable (Anon., 1999).