A SURVEY OF THE CHEMICAL QUALITY OF WATER USED IN THE FISH PROCESSING INDUSTRY

An abundant supply of good quality water is the life blood of fish processing industry. This fact has been well recognised by the fishery scientists and technologists as is reflected in the large number of reports on the bacterial quality of water (Pillai, *et al* 1965; Iyer *et al* 1966 & 1969; Choudhuri, *et al*1970). However no report on the chemical quality of water used in our fish processing industry is available at present though it is known that the chemical quality of water influences the quality of finished product; as for example high amounts of copper and iron causing blackening in canned prawns (Nandaknmaran *et al*, 1969 & 1970). The primary fish processing centres, where collection and dressing of the material is done, are scattered all along the coastal area and due to the absence or inadequacy of public water supply these processing centres depend on wells or borewells for water. Even in the canning or freezing factories, which are usually located in urban areas dependence on private sources of water, at least occasionally, is unavoidable.

This report presents data on the chemical characteristics of one hundred samples of water used in the fish processing industry, examines the extent of dependence on private sources of water and stresses the necessity of improving the water quality. Water samples were collected during 1966 to 1970 from various fish processing establishments situated in and around Cochin and were analysed for pH, total dissolved solids (TS.), chlorides (Cl), total hardness (T H), temporary hardness (Te H), permanent hardness (P H), hardness due to calcium and magnesium (Ca-H & Mg-H), alkalinity, sulphates (SO_4) copper (Cu) and Iron (Fe) as per APHA (1960) methods. A survey was carried out in and around Cochin to find out the various sources of water used in the various fish processing establishments.

The percentages of water samples conforming to the Indian Standard Specification for water for ice manufacture (IS: 3957-1966) based on each of the criteria are shown in Table I, together with the

minimum requirements. Of the total samples only 40% were within the limits of acceptability when all the quality criteria were considered together, the limiting factor being alkalinity. Sulphate content was less than 100 ppm in 89% of the samples and copper less than 0.2 ppm in 93%.

The percentages of the samples falling into different ranges of alkalinity and hardness are given in Table II while Table III gives the percentage distribution of samples according to the content of total dissolved solids and chlorides.

Table IV summarises the result of the survey on the source of water used in fish processing.

From the results in Table II it is seen that only 32% of the samples is soft while really hard water is 25%. Though the exact influence of hardness of water on fish quality is not known, it is known to reduce the effectiveness of quarternary amonium bactericides and to influence toughening of peas during blanching for canning or freezing.

TABLE-I PERCENTAGE DISTRIBUTION OF WATER SAMPLES ACCORDING TO EACH OF THE CRITERIA.

S. No.	Criteria	% of samples within limit	Limit of acceptability
1	pH	99	6.5 to 9.2
2	Total dissolved solids	71	1000 ppm
3	Chlorides (Cl)	69	250 ,,
4	Alka linity	42	100 ,, as $CaCO_3$
5	Total hardness	90	600 ,, ,,
6	Sulphate (SO_4)	96	200 ,,
7	Copper	100	1 ,,
8	Iron	63	0.3 ,,

TABLE III PERCENTAGE DISTRIBUTION OF SAMPLES BASED ON TOTAL DISSOLVED SOLIDS AND CHLORIDES

Range of values	% distribution of samples based on	
	T S	Cl
Less than 250 ppm	—	68
,, 500 ,,	57	—
251 to 500 ,,	—	6
501 to 1000 ,,	14	12
1001 and above ,,	29	14

TABLE IV PERCENTAGE DISTRIBUTION OF FISH PROCESSING FACTORIES ACCORDING TO THE SOURCE OF WATER USED

Source of water supply	% of distribution
(a) Public water supply only	53.5
(b) Public water supply in addition to private supply.	20.9
(c) Private water supply (weli borewell)	25.6

The results in Table III show that the total dissolved solids is mainly sodium chloride. This is especially so in the case of bore-well waters. The proximity of the wells to the sea-shore and the direction of the tide contribute to the amounts of sodium chloride usually encountered.

TABLE-II PERCENTAGE DISTRIBUTION OF WATER SAMPLES INTO DIFFEREFT RANGES OF VALUE OF HARDNESS & ALKALINITY

Range of Values	T H	Te H	P H	Quality Factors Ca H	Mg-H	Alkalinity
Less than 100 ppm	32	83	56	49	69	42
101 to 250 ,,	43	12	25	25	12	44
251 to 500 ,,	12	5	6	13	11	13
501 and above	13	0	13	13	8	1

However the amount of sodium chloride may not influence the quality of the procssed fish as storage in refrigerated sea water or sea water ice is an accepted method of fish preservation. Results in Table IV show that at least in 25% of sea-food processing units only water from private sources is used. No treatment other than chlorination in a few cases was imparted to the private supply. Water softening or demineralisation was not at all used. Though no attempt was made in this study to correlate the quality of water used with the quality of the processed product, the results reveal the poor quality of the water used in majority of the processing units.

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