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Review Article

SURIMI WASHING PROCESS AND SALTING IN AND SALTING OUT METHOD OF PROTEIN EXTRACTION

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Surimi washing process:

Synonym: Traditional washing process, Surimi washing process.

History: The industrialized surimi-making process was refined in 1969 by Nishitani Yosuke of Japan's Hokkaido Fisheries Experiment Institute

Principle: Removal of soluble materials from Proteinaceous rich substance by repeated washing with water.

Definition: Surimi is defined as a Wet Protein concentrate made of fish muscle that is obtained from mechanically deboned fish flesh that is processed through Mincing, Washing, Mixing with GRAS cryoprotectant, and Freezing. (Okada,1992), when obtained from other types of muscle (that is, not fish), the protein concentrate is known as Surimi-like material

Process:

Mincing: As the surface area is increased and normally separated reactants are brought in close contact, mincing also favours degradation reactions

Washing: Minced fish with water has positive effects on functionality, colour and stability (Nishioka *et al.,* 1990; Tanikawa, 1985). It is then beaten to pulverize to form a gelatinous paste. *Surimi*, i.e. washed fish mince with added cryoprotectants,

Cryoprotectantion: Currently in commercial surimi production, a mixture of 4% sucrose, 4% sorbitol in conjunction with phosphate, has been adopted as the primary cryoprotective additives. These high-MW polyols and glucose polymers are believed to stabilise proteins by raising the glass transition temperature (Tg) of a solution (Levine and Slade, 1988a and b)

Advantages: Gels produced by the conventional surimi-washing process had the highest gel strength and the highest Salt soluble protein content among all processes tested. Myofibrillar protein, which is salt soluble, plays an essential role in gel formation (Hultin *et al*., 2005;

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Park and Lin, 2005), and the gels contained concentrated myofibrillar protein due to the 3 cycle washing process. Chaijan *et al*., 2006 reported that the breaking force (gel strength) of sardine and mackerel surimilike material produced using surimi-washing process (using water or NaCl washing) was greater than that of materials produced using the alkaline solubilisation process with or without prewashing.

Gels derived from surimi by salt and heat are incorporated into various traditional products found in Asia and in shellfish analogues, successfully marketed in Europe, America and Australia.

Disadvantages:

A broad commercial exploitation and acceptance of surimi has been limited because of the very high quality requirements of the Asian market

Many technical difficulties hinder the development of large scale commercial process. One problem is the exceedingly low protein yield (as surimi mass) of initial fish (Anon, 1987). Moreover surimi has little oxidative stability, limited by rancidity (Gandemer, 1999); Due to all the difficulties of processing surimi from fatty species like herring, there is no large scale commercial process available today.

Salting in and salting out: (Nelson and Cox, 2000)

History: Hofmeister discovered the influence of different salts on hydrophobic interactions of proteins

Principle: The solubility of proteins is strongly dependent on the salt concentration (ionic strength) of the medium.

Mechanism:

- Salting in: The solubility of protein increases as the ionic strength increases, because more and more of the well-hydrated inorganic ions are bound to the protein's surface, preventing aggregation of the molecules.
- Salting out: At very high ionic strengths, the salt withdraws the hydrate water from the proteins and thus leads to aggregation and precipitation of the molecules (salting out). Separate proteins from the mixture according to their degree of solubility (fractionation).

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