The Effects of Freezing and Frozen Storage on the Status of Fish Tissue

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ABSTRACT

Rockfish has been slow and fast frozen, and maintained in frozen storage at -5, -12 and -20°C. The chemical/biochemical status of the fish has been assessed by measuring water content, pH, water holding capacity, viscosity of fish homogenate, fatty acid content of the lipid, TBA number, protein solubility, myofibrillar protein fraction electrophoresis and ATPase activity, and DSC denaturation profiles. Physical damage due to ice crystal formation have been observed by optical microscope and electron microscope, in which isothermal-freeze fixation was employed to well-preserve the frozen structure. Ice crystal size and its distribution have been estimated.

Among these tests, changes in water holding capacity, myofibrillar protein solubility and ATPase activities indicate a difference in the effect of different freezing rates and storage temperatures. A clear correlation is found between these changes and the change in ice crystal size. It suggested that the frozen structure as well as the composition of the frozen matrix plays an important role in the rate of some deterioration processes in frozen fish.