No. 0808

Development of Highly Efficient “Nigari” Based Precipitator for Wasted Waters

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Summary

Water pollution due to the wasted water from usual human lives and industrial factories demonstrated the substantial effects on human health as well as the aquatic organisms especially from the ecological aspects. To solve the problems, increase in the levels of the regulated values of the waster waters and the regulation of total amount of the wasted waters are now being discussed. However, the available water cleaning system cannot cope with the high regulated values without using the membrane filtration system which requires an expensive plant system. Under these circumstances, a highly efficient water cleaning system with lower cost is now being required.

We have long studies about the biochemical mechanism of the synthesis of the shell which is made of calcium carbonate and the small amount of organic materials. The organic materials have been supposed to play important roles in the synthesis of the shell, but details have been remained unknown. Our recent studies newly suggested that the spider silk like proteins are involved in the formation of the shell and the artificial degradation of the spider silk proteins under moderate condition will lead the production of the highly efficient precipitator for the mud waters that is derived from the construction of the building and the digging of the soil. In the preliminary experiments, we found that our shell derived precipitator named “hydrotrapper” was also utilized for the separation of organic matters in the wasted waters in the presence of magnesium ions. This finding led me to use “Nigari” as the coagulator for the organic wasted waters mainly composed of protein.

As a result, Nigari was effective for the precipitation of soy bean proteins, milk proteins, fish muscle proteins and egg proteins, but the most effective pH ranges were different according to the proteins. For example, most effective precipitation was observed for soy bean proteins at acidic pH, while those for milk and fish muscle proteins were observed at acidic to neutral pH ranges. Interestingly, egg proteins were effectively precipitated at alkaline pH ranges. These difference attitudes against pH were probably due to the difference of isoelectric points of main components of the protein solutions. Our studies suggest the development of the specific precipitator including Nigari to recover the proteinous components for the wasted waters.