

## Chapter 4

### Conclusion

1. Skipjack tuna internal organs contained both acid and alkaline proteinases, depending upon the organs. Optimal temperature and pH of proteinases varied with organs. Spleen contained the highest proteolytic activity. Generally, proteolytic activities from all organs decreased as NaCl concentration increased. The activities sharply decreased during fermentation, especially in the first month.

2. Deterioration of tuna internal organs was more pronounced during storage at room temperature. However, no marked effects of storage condition on overall changes in chemical, physical and microbiological characteristics of fish sauce generated during fermentation were observed. Therefore, fish sauce produced from tuna internal organs kept at either refrigerated temperature or room temperature for up to 8 h can be used for the production of fish sauce. However, fish sauce produced from tuna internal organs stored at room temperature consisted of lower biogenic amines content than those from internal organs kept in ice.

3. Addition of  $\text{CaCl}_2$  in combination with pH adjustment to 9.0 apparently had no effect on either activation of proteinase activity or the acceleration of fermentation. pH adjustment of tuna internal organs increased the hydrolysis during the first 0.5 month of fermentation. Lowering the salt could also accelerate the hydrolysis at the beginning of fermentation (0.5 month). Salt level used affected the

intermediate products from Maillard reaction but showed no marked effect on browning development.

4. Aging of fish sauce at room temperature for up to 8 weeks caused the increase in browning intensity of 6-months fermented fish sauce from tuna internal organs. Nevertheless, no changes in  $A_{294}$  and fluorescent intensity were noticeable during aging.