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## Dual Mode Sorption and Diffusion of NaCl in Protein Foodstuffs

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### Summary

By this study, we aim to obtain insight into mechanisms of NaCl diffusion in pork meats, comparing with those in solidified egg white. It has been generally presumed that NaCl in foodstuff diffuses with a constant Fick's diffusion coefficient,  $D$ , through liquid water channel imbibed in them. However in the present study, we experimentally obtained skewed bell shape variations of  $D$  with NaCl concentration,  $C$ , in pork meats with respective maxima at certain low NaCl concentrations. These variations were interpreted in terms of a dual mode sorption and diffusion theory, which had been successfully applied to NaCl diffusion behaviors in Japanese radish and solidified egg white. This interpretation gives a thermodynamic diffusion coefficient,  $D_T(p)$  for the partition species of NaCl and another one,  $D_T(L)$  for the Langmuir type sorption species, both in the water swollen substrates in the meats. It was found that  $S$  values of cooked meats decreases to about half values of the raw meat by the elution of drip, which is in contrast of the constancy of  $D$ 's for solidified egg white at different temperatures. With the two  $D_T$ 's and equilibrium parameters, the theory explained the remarkable decrease of  $D$  value with  $C$  at 21°C found by Guiheneuf *et al.* and nearly constant  $D$  values in the higher  $C$  range at 5°C reported by other researchers. Experimentally obtained sorption isotherms of NaCl, which was slightly convex upward in the low  $C$  range, were satisfactory reproduced with the parameters and the fractions of water swollen substrates in the whole meats.