

Dual mode diffusion and sorption of NaCl in foodstuffs under cooking conditions

著者名(英)	H Hashiba, H Gocho, J Komiyama
journal or publication title	紀要
volume	VOLN2
page range	34
year	2010-03-01
URL	http://id.nii.ac.jp/1345/00003490/

学会ポスター発表

21. World Congress International of Federation for Home Economics 2008.7.29.

Dual mode diffusion and sorption of NaCl in foodstuffs
under cooking conditions

H. Hashiba*, H. Gocho**, and J. Komiyama***

* Tokyo Seiei College** Jissen Women's University,*** Professor emeritus, Tokyo Institute of Technology

Abstract

Despite of the importance in the working process, the sorption and diffusion behaviors of NaCl in various foodstuffs have been left unexplained. The isotherms show slight curvatures and the Fick's diffusion coefficients often show strong dependences on the concentration in the substrate. The present report first reports the sorption isotherms and the variations of Fick's diffusion coefficients of NaCl in pre-cooked Japanese radish, egg white and pork loin. The maximum showing variations of the Fick's diffusion coefficients were interpreted quantitatively with two thermodynamic diffusion coefficients, $D_T(p)$ and $D_T(L)$, an equilibrium parameter, α , and the concentration of the L site. Thus the sorption and diffusion of NaCl in the three substrates were explained by a unified view, presented in this study.

学会ポスター発表

Proceedings of the 10th Asian Textile Conference 2009. 9.8.

The theoretical basis of dual mode diffusion of NaCl in non-penetrating
porous materials-foodstuffs as the model

H. Hashiba*, H. Gocho**, and J. Komiyama***

*Tokyo Seiei College, ** Jissen Women's University,*** Professor emeritus, Tokyo Institute of Technology,

Abstract

In non-penetrating polymeric porous materials, the rate determining step of the diffusion of NaCl should lie in the multiplied polymeric material walls. Diffusion from aqueous solution of NaCl takes place through the water swollen walls, if the material is hydrophilic. This study presents the theoretical basis of the diffusion for the case of dual mode diffusion in the walls. 1. Representation of the thermodynamic diffusion coefficient in terms of the phenomenological coefficients in non-equilibrium thermodynamics. 2. Incorporation of dual mode sorption and diffusion mechanism and obstruction by molecularly dispersed polymer chain. 3. Non-contribution to the overall diffusion rate of the diffusion in imbibed *liquid* water regions due to the rapid diffusion in them and never the less due to the discontinuity of the liquid water phase. Foodstuffs like Japanese radish, solidified egg white and pork meats are good examples of such non-penetrating porous materials. The formulation is discussed on the experimentally found variations of Fick's diffusion coefficients that show maxima.