

**Title** Kinetics of water diffusion in corn grain during the alkaline cooking at different temperatures and calcium hydroxide concentration

**Author** J.L. Fernández-Muñoz, A.A. Acosta-Osorio, M.A. Gruintal-Santos and O. Zelaya-Angel

**Citation** Journal of Food Engineering, Volume 106, Issue 1, September 2011, Pages 60-64

**Keywords** Nixtamalization; Hydration and hydration rate; Mathematical model; Michaelis–Menten; Peleg

### **Abstract**

The kinetics of corn grains hydration during the nixtamalization process is described for different temperatures, cooking times and  $\text{Ca}(\text{OH})_2$  concentrations. Samples were prepared using different cooking times from 0 to 120 min; cooking temperatures of 62, 72, 82, and 92 °C, and  $\text{Ca}(\text{OH})_2$  concentrations of 0.0%, 0.8%, 1.0%, and 2.0% related to the mass of corn grains. The fitting of the experimental data to the empirical Michaelis–Menten equation gives a good approach of the hydration process. From the first derivate of the Michaelis–Menten equation the rate of the corn grain hydration can be obtained. This mathematical model predicts the hydration and hydration rate of the corn grains during the cooking time of the nixtamalization process. Furthermore, with this proposed model, we can predict that for short times the rate reaches its maximum, and tends to zero for long times as the saturation of the grain is reached. It is concluded that hydration and hydration rate of white corn grains depends significantly on the temperature and cooking water lime concentration ( $P < 0.005$ )