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Effects of Addition of Salts on Drying Rates and Surface Properties of Dried Products in Food Drying

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Summary

Drying is one of the most important food processing unit operations. When foods are dried properly, they are suited for storage and distribution as dried foods are highly stable as well as light and compact. However, as food is a complicated multi-component system, it is still not clear how a certain food is dried and what type of additives is suitable for the drying.

Although salts are common components in foods, their properties and functions during drying are still not well understood. For example, the amount of salt is adjusted empirically to control the drying rate of Japanese traditional noodle, Somen. The purpose of this study is to examine the effect of salt on drying rates and surface properties of flour-based dough food (model food for noodle). Slab-shaped model dough samples (40 mm x 40 mm, thickness 0.5 mm, initial water content is ca. 0.5 kg-water/kg-flour) were dried in a drying chamber, which is maintained at constant air temperature, air humidity and air flow velocity. Most experiments were carried out at 303 K.

The drying rates of flour dough samples were higher than those of sugar solutions. Water sorption isotherm data showed equilibrium water contents of flour dough samples are lower than those of sugar solutions. Because of these two factors the flour dough was dried to ca 13% water content (product specification) even at low temperatures (303 K). Addition of salt (sodium chloride) increased the drying rate remarkably especially when the initial salt concentration is above 10%. When salt solutions are dried, solid phase or crystals appear on the surface with the progress of drying. However, during drying of the flour dough sample such crystals were not observed. One of the reasons of higher drying rates may be salt-gluten interaction, which might create a rather rigid structure allowing high water diffusion.