

Influence of Solid-State Acidity on the Decomposition of Sucrose in Amorphous Systems II  
(Effect of Buffer)

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**Abstract:** It was of interest to investigate the solid-state acidity using indicator probe molecules and sucrose degradation. Amorphous samples containing lactose, sucrose, buffers (citrate, malate, tartarate or phosphate) with different pH values and sodium chloride (to adjust the ionic strength) were prepared by freeze-drying. The lyophiles were characterized using powder X-ray diffraction, differential scanning calorimetry and Karl Fischer titremetry. The solid-state acidity of all lyophiles was measured using diffuse reflectance spectroscopy and suitable indicators (thymol blue or bromophenol blue). Selected lyophiles were subjected to a temperature of 60oC and were analyzed for sucrose degradation using the Trinder kit. The results obtained from this study have shown that good correlation can be obtained between the solid-state acidity and the molar ratio of the salt and the acid in solution. The degradation of sucrose in the lyophiles is extremely sensitive to the solid-state acidity and might be able to provide even a better estimate for the acidity than the indicator probe molecules. The Hammett acidity-rate profile for sucrose degradation in the lyophiles (using four different buffers) was also obtained. The profile showed similarity to the pH-rate profile in solution and no buffer catalysis for sucrose degradation was detected in this study.