PREPARATION AND PROPERTIES OF SOME MODIFIED MANIOC STARCHES

S. S. M. de Silva, J. M. P. Jayasundera and N. S. Kumar
(Department of Chemistry, University of Peradeniya)

Retrogradation effects cause instability of starch pastes and can lead to increasing cloudiness, a decrease in viscosity and finally precipitation. Properties of natural starches can be changed by various treatments so that poperties suitable for many industrial applications may be introduced.

Manioc starch was modified by the following procedures.

(1) Oxidation with sodium hypochlorite solution at 38°C, while maintaining the pH at 9.0-9.5 (Starch **A**).
(2) Treatment with sodium dihydrogen phosphate at 40-50°C for 30 min. (Starch **B**).
(3) Treatment with 5% sodium chloride solution at 54°C for 60 min. and then with $(CH_3)_2SO_4$/NaOH for 30 min. (Starch **C**)
(4) Acetylation with acetic anhydride at pH 8.0-8.4 (Starch **D**).
(5) Treatment with chloroacetic acid at 28° (Starch **E**).

The viscosity of a 2% solution of unmodified manioc starch was compared with the viscosity of 2% solutions of starches **A, B, C, D** and **E** respectively. Starches **B, C** and **E** which had the lowest initial viscosity showed little change in viscosity over a period of seven days. Starches **A** and **D** with moderately high viscosity were stable for about 30 hr. and then showed a decrease in viscosity. The solution then stabilised after 50-60 hr.

The rate of retrogradation of unmodified manioc starch and starches **A, B, D** and **E** respectively was determined titrimetrically. Results indicated a relationship between the rate of retrogradation and rate of change in viscosity of the starch solution. The decrease in viscosity was greatest when the rate of retrogradation was highest. An anomalous result was obtained with Starch **B** which showed a high rate of retrogradation while the viscosity remained virtually unchanged.

Results indicate that starches **B** and **E** may be useful as stable starch solutions of low viscosity, while starch **A** could be used as a moderately stable starch solution of higher viscosity.

References:

1. S. A. Watson in "Methods in Carbohydrate Chemistry" IV, p. 150 Ed. R. L. Whistler, Academic Press, New York & London (1964).