A STUDY OF THE PHYSICOCHEMICAL PROPERTIES OF COMBINED CROSSSLINKING AND PHOSPHORYLATION REACTIONS BY SEMI-DRY STATE

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A STUDY OF THE PHYSICOCHEMICAL PROPERTIES OF COMBINED CROSSLINKING AND PHOSPHORYLATION REACTIONS BY SEMI-DRY STATE

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1% sodium trimetaphosphate (STMP) and 4% sodium tripolyphosphate (STPP) that the pH 27% 9.5 120°C for 2 hours. At the end of the reaction, the viscosity of the solution is measured to determine the extent of crosslinking. The viscosity values are compared with the control samples to determine the effect of crosslinking and phosphorylation reactions on the solution.

204.42 RVU 509.00 RVU 67.50 °C

1%STMP and 4%STPP have a higher viscosity than the control samples. The reaction temperature affects the extent of crosslinking and phosphorylation, and the effect is more pronounced at higher temperatures.
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ABSTRACT

One step combined modification of rice flour by crosslinking and phosphorylation to obtain high peak viscosity which provides high freeze-thaw stability was studied. Native rice flour was combined with 1% sodium trimetaphosphate (STMP) and 4% sodium tripolyphosphate (STPP) (based on dried weight of rice flour) to a 27% moisture content and to a pH of 9.5. The reaction temperature was 120 °C with 2h reaction time. The reaction mixture was directly exposed to hot air in an oven allowing the gradual evaporation of water to dryness after 2h reaction time. It was found that the crosslinking reaction occurred while the mixture was wet and phosphorylation reaction when it was dried. The physicochemical properties of modified rice flour were investigated. It was found that the peak viscosity of native rice flour was 204.42 rapid viscoamylograph units (RVU). After modification, the peak viscosity increased to 509.00 RVU. The gelatinization temperature of the native rice flour was 71.64 °C and the modified rice flour was 67.50 °C. This property confirmed the phosphorylation reaction in the native rice flour. After crosslinking and phosphorylation, the modified product exhibited high peak viscosity. The freeze-thaw stability of the modified rice flour also improved in comparison with the native rice flour. The modification of the native rice flour with 1%STMP and 4%STPP was also compared with those of 1%STMP, 4%STPP or 5%STPP. It was found that the combination of rice flour with 1%STMP and 4%STPP exhibited the highest peak viscosity and the best freeze-thaw stability.

KEY WORDS : CROSSLINKING / PHOSPHORYLATION / RICE FLOUR / AMYLOSE CONTENT / FREEZE-THAW STABILITY