# Modification of Foamed Articles Based on Cassava Starch

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This work reports the influence of radiation, plasticizers and poly vinyl alcohol (PVA) on the barrier properties [water vapour permeability (WVP)] [1] and mechanical properties (tensile strength and elongation; compression resistance and flexibility) of foamed articles based on cassava starch. The starch foam was obtained by thermopressing process [2]. Poly ethylene glycol (PEG, 300) was selected as plasticizer and water was necessary for the preparation of the foams. The foamed articles based on cassava starch were irradiated at low doses of 2 and 5 kGy, commonly used in food irradiation.

The mechanical properties of starch foams are influenced by the plasticizer concentration and by irradiation dose. An increase in PEG content showed a considerable increase in elongation percentage and a decrease in the tensile strength of the foams; also increase the permeability of the foams in water. After irradiation, the barrier properties and mechanical properties of the foams were improved due to chemical reactions among polymer molecules [3]. Irradiated starch cassava foams with poly vinyl alcohol (PVA) have good flexibility and low water permeability. WVP can be reduced by low doses of gamma radiation. The influence of dose on mechanical properties of foams is showed in Table 1. In doses of 2 and 5 kGy, the compression resistance increase with the increasing of dose.

Table 1. Mechanical properties (compression resistance and flexibility) and water absorption of foam after soaking in water for 15 minutes at 25°C (increase weight).

| Foam | Dose (kGy) | Compression resistance (N) | Flexibility (mm) | Increase weight (%) |
|---|---|---|---|---|
| PEG | 0 | 20.87 | 3.75 | 150 |
| PEG | 2 | 21.50 | 4.90 | 130 |
| PEG | 5 | 22.00 | 4.07 | 120 |
| PVA | 2 | 23.75 | 5.20 | 70 |
| PVA | 5 | 25.99 | 4.90 | 50 |

[1] ASTM Standard. Standard test methods for water vapor transmission of materials. Annual book of ASTM standards. Designation E96-E80, 1989, p. 730; [2] P.Ponce, L.G.Carr, D.F.Parra, A.B.Lugão, C.R.Bastos. 2005. Formulação para produção de espumas de amido resistentes à água e a ciclos de resfriamento, congelamento e descongelamento. PI0502338-6; [3] M. Zhai, F. Yoshii, T. Kume, Carbohydrate Polymers, 2003, p.311; [4] P. Cinelli, E. Chiellini, J.W. Lawton, S.H. Imam, Polymer degradation and Stability, 2005.

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