

Effect of High Pressure Processing on ^1H mobility in tapioca starch gels

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High pressure processing can induce starch gelatinization. HPP induced gels partially preserve the granular structure of the native starch, are harder, retrograde less and interact with water differently than thermally induced gels. A stronger water-solid and/or solid-solid interaction in HP induced gels was previously hypothesized.

The objective of this work was to investigate the ^1H molecular mobility of water - starch gels induced by hyperbaric processing.

Tapioca starch – water suspensions (5, 10, 15 and 20 % starch/water) were subjected to high pressure treatments (10min-32°C **HP**; 10 min-80°C **HP-T**) or heated (80°C-10min **T**). Gels were characterized for their ^1H molecular mobility (T_1 , inversion recovery, T_2 , CPMG, D) with a 20 MHz NMR spectrometer (the miniSpec, Bruker) at 0 - 15 days of storage (4°C).

A monoexponential relaxation was found in ^1H T_1 and ^1H T_2 indicating the presence of only one detectable ^1H population in all gels considered in this study. ^1H molecular mobility was found to be affected by starch concentration (decreasing ^1H T_1 , T_2 and D with increasing concentration). ^1H T_1 did not show significant differences among gels produced with different processing conditions and during storage. T_2 was found to be higher in gel-T than in gel-HP while gel-HP-T had an intermediate value. For example, ^1H T_2 of 5% (starch/water) gel-T (0 day) was 1428 ms while it was 769 ms for gel-HP and 1111 ms for HP-T gels. ^1H T_2 to T gels remained higher than ^1H T_2 of HP gels during the 15 days of storage. ^1H diffusion coefficient was affected both by starch concentration and by processing conditions: D was generally higher in thermal than in HP treated samples. HP-T gels showed a intermediate behavior between T and HP gels only for high starch content samples (15 % and 20 %).

^1H molecular mobility of samples gelatinized with High Pressure Processing was found to be different than that of thermal samples. In particular a lower ^1H mobility was found in HP induced gels.