

Use of Temperature-Controlled Low Field ^1H -NMR to Study Changes during Simulated Baking of a real food products.

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The quality of food products is governed by its organoleptic properties which are the results of numerous physical-chemical transformations through the different steps of its process (mixing, kneading, cooling, or baking...). When water content is or is becoming the limiting parameter in food materials, the competitive hydration of the different components may explain evolutions in the products like crystallization, protein denaturation, non-enzymatic browning, lipid oxidation... The objectives of food technologists are to manage these changes in raw food materials in order to obtain either intermediary ingredients able to be transformed in an industrial way, mainly by a fast kinetic of rehydration, or stable food products for consumers, or even new food materials for the market development. Low field NMR relaxometry is now widely used in food domain as routine quality control test for the determination of solid/liquid or oil/water ratios in plant seeds, oil, margarine and other fat content products. In order to predict food stability or specificity, more developments are still needed to study molecular mobility, and not only the water one, in food materials that are mostly very heterogeneous in composition and could be at low water content.

In this presentation, the low resolution bench-top H-NMR study of real food products will be showed as function of temperature or humidity variations. A commercial gluten protein powder and biscuit dough of the french "Petit Beurre" are the chosen examples to illustrate some possible applications. For spin-spin relaxation time T_2 determination, classical FID, solid, Hahn and CPMG echoes sequences were used and the NMR results were analysed in regards of other time scale techniques (Fig.1).

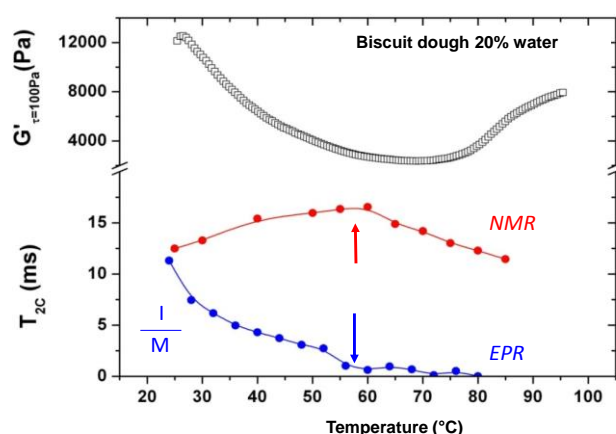


Fig1: Storage modulus (1Hz), spin-spin relaxation time (CPMG) and Tempol immobilization (EPR) during the biscuit dough baking.