

# **Impact of a Compressed Carbon Dioxide Impregnation Process in Combination with Antimicrobial Active Extracts on the Properties of Almonds**

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The globalization of food trade, a growing world population, climate change and rapidly changing food systems effecting the safety of food. Foodborne illnesses are a burden on public health and contribute significantly to the cost of health care. Unsafe food creates a vicious cycle of disease and malnutrition, particularly affecting infants, young children, elderly and the sick. Due to the variety of available food that differ in numerous properties e.g. water content, hardness, texture and susceptibility to bacterial contamination -to name just a few- the preservation techniques to obtain safe food are divers. The widespread opinion that dry food is safer than food with a high water content is true but because of the adaptability of bacteria to long storage times under dry conditions new risks arises.

To improve the safety of especially almonds the Fraunhofer Institut UMSICHT develops a high pressure CO<sub>2</sub> treatment. The focus of research lies in the holistic view of the process influences on the properties of the almond. We showed that the high pressure CO<sub>2</sub> process is able to reduce bacterial contamination within the range of, in America by law required, log 4 reduction and higher. To enhance the process we impregnate antimicrobial active CO<sub>2</sub> extracted oils from hop, sage and oregano into the surface of the almond. We performed several test regarding the physical properties of the almonds to show the influence of the process on the hardness, water activity, water content, oxidation potential and oil composition. We found that with a gently adjusted pressure curve the almond structure remains undamaged with a process duration of less than one hour. The water contend increases slightly but reversible during the process, after storing under ambient conditions.