STEAM-JET AGGLOMERATION OF SKIM-MILK POWDERS: INFLUENCE OF THE RAW MATERIAL PROPERTIES AND PROCESS PARAMETERS.

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Steam-jet granulation is a process used in dairy industry to produce instant agglomerated milk powder. Agglomerated instant powders exhibit improved wettability and rehydration behaviour, which are essential attributes for coffee whiteners applications. Although there is a growing interest for research in this area, the steam-jet granulation process has been little studied to date and the quality control at industrial scale remains experimental and empirical. Moreover, the multi-factorial causes at the root of the rehydration properties of the final agglomerates make it difficult to identify the key process parameters that should be controlled to meet the quality requirements.

The present study investigated industrial data to study how different raw materials properties and process parameters interact and contribute to the production of skim milk agglomerates with improved functional properties.

Dynamic vapour sorption and differential scanning calorimetry were used to characterize both the native raw materials and the agglomerated powders. A multivariate data analysis was used to identify correlations between the raw material properties, the process parameters and the physicochemical and functional properties of the products. The water content of the native raw material and the post-drying temperature were found to be critical in controlling the humidity and thermodynamical properties (glass transition temperature) of the agglomerates. These properties were correlated to the wetting time and showed their significant influence on the rehydration behaviour of the agglomerates. Recommendations concerning production parameters are given to avoid conform rehydration behaviour in industrial agglomerated skim milk powder.