

160. THE SPECIFICATIONS FOR THE SUSTAINABLE-DESIGN OF THERMO-HYDRO-MECHANICAL PROCESSES OR THE ELABORATION OF AGGLOMERATED PRODUCTS

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Although scientific works have been conducted over the 15 last years, theory of agglomeration are still missing to understand the uses of reactive powders during the processing of durum wheat into agglomerated couscous grains. Due to the multiplicity of mechanisms, the end product properties cannot be predicted. More over the current industrial process is particularly poorly eco-efficient and energy consuming. The objective of the present work is to generate relevant data for the specifications for the sustainable-design of thermo-hydro-mechanical processes for the elaboration of couscous grains. Our approach is based on coupling experimental and modeling works to investigate the contributions at complementary scales: at the products and process scale. Knowledge integration is based on the elaboration of functional diagrams using a Dimensional approach (DA). The representation by dimensionless numbers for water/solid particle meeting, particle sticking and grain mobility, associated with the governing ratios which characterize the mechanisms of mass and energy transfers, allows to propose specific diagrams to describe the couscous process. Dimensional analysis (DA) is considered as a way to allow the decomposition of the whole couscous process. Dimensional Analysis is first conducted to investigate the rotating durum process under different trimming parameters and process conditions. The target parameters have been chosen from the physicochemical properties of the final agglomerated powder.