

A STUDY ON SPRAY DRYING TECHNOLOGY IN FOOD INDUSTRY

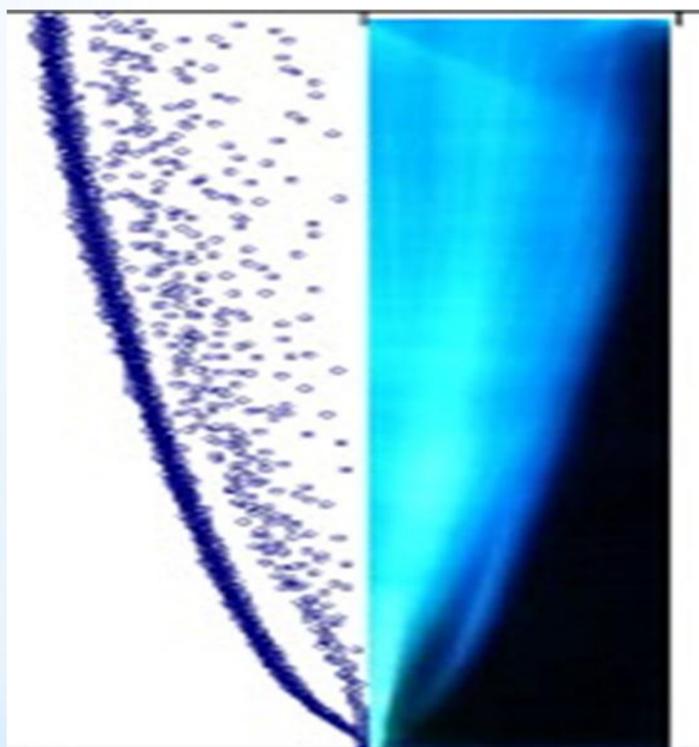
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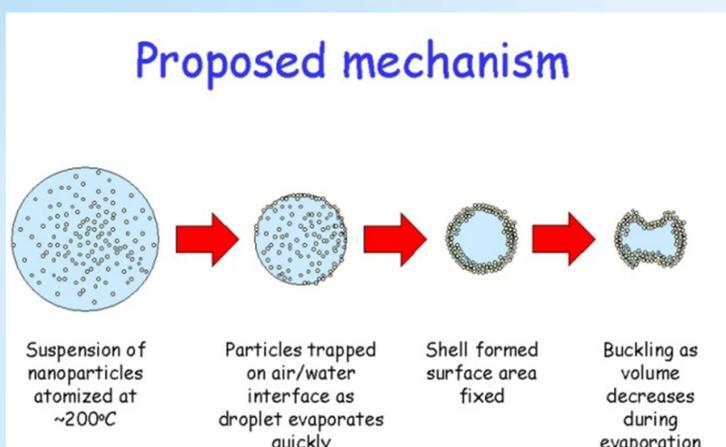
Introduction:

Spray drying is one best drying methods to convert directly the fluid materials into solid or semi-solid particles. Spray drying is a unit operation by which a liquid product is atomized in a hot gas current to instantaneously obtain a powder. The gas generally used is air or more rarely an inert gas, particularly nitrogen gas. The initial liquid feeding can be a solution, an emulsion or a suspension. It can be used to both heat-resistant and heat sensitive products. Spray drying involves in the complex interactions of process, apparatus and feed parameters which all have an influence on the final product quality of the product being dried.



Real spray image

Mechanism:



Result:

The results of statistical analysis showed that the inlet air temperature and feed flow rate were significant effect on yield and deposit of powder, with increasing of these parameters, the wall deposit was increased and yield was reduced. The important parameters that play role on powder deposit were the sticky point temperature that for orange juice powder at 2% moisture was 44°C.

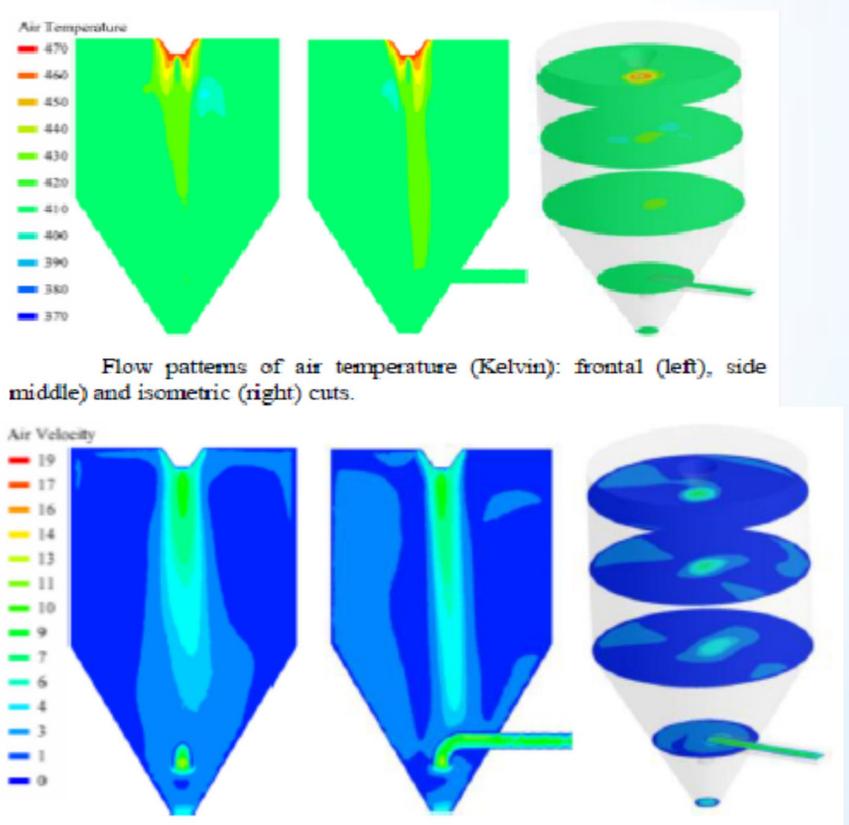


Fig.3 Flow fields of air velocity (m/s): frontal (left), side (middle) and isometric (right) cuts.using COMSOL

Conclusion:

Fruit juice powders have many benefits and economic potentials over their liquid counterparts such as reduced volume or weight, reduced packaging, easier handling and transportation, and much longer shelf life. The quality of spray dried food is quite dependent on the operating parameters. Thus, an understanding of factors affecting the product properties is required for the process optimization, in order to obtain products with better nutritional characteristics and process yield. The process of optimization can be achieved by using Darcy's Law and solute transport in COMSOL Multiphysics where we can study the variation of density with concentration.

References:

- Murugesan, R. and Orsat, V. 2011. Spray Drying for the Production of Nutraceutical Ingredients-A Review. Food Bioprocess Technology 8: 1-12.
- Chegini, R.G. and Ghobadian, B. 2007. Spray dryer parameters for fruit juice drying. World Journal of Agricultural Science 3: 230-236.
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