

食品冷却抽真空过程流场影响参数分析 Parameters Analysis on Flow Performance in Food Vacuumizing Process

韩志 谢晶 潘迎捷

浙江海洋学院

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摘要: 建立了描述食品冷却抽真空过程的传热、传质模型,采用计算流体力学进行了非稳态模拟,实验表明模型与实际吻合较好。在此基础上,对影响流场的参数:真空泵抽速、容器自由容积、是否放置隔板进行了模拟研究。研究表明:真空泵抽速越大,真空室内的极限压力越小,真空室的最低温度越低,达到最低温度所消耗的时间越长;自由容积不影响真空室的极限压力,自由容积越大,真空室的最低温度越高,达到最低温度所消耗的时间越短;放置隔板对流场平均温度和极限压力的影响,可以等效为自由容积的减小。 A mathematical model was developed for the heat and mass transfer in vacuumizing process. Computational fluid dynamics technology was employed for simulation based on the unsteady model. The simulation results fitted experimental data well. After that, several parameters (pumping speed, free volume, and clapboard etc.) which would affect the flow field were analyzed. The higher the pumping speed is, the lower the pressure limitation is, the lower the minimum air temperature of vacuum chamber is and the more time spent in reaching minimum temperature. The free volume did not affect pressure limitation of the vacuum chamber. The greater the free volume is, the higher the minimum air temperature of vacuum chamber is and the less time spent in reaching minimum temperature. Referring to the pressure limitation and the average temperature of the flow field, the placement of clapboard can be equivalent to the reduction of free volume.

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