Tuan Quoc Le 2012: Drying Kinetics and Optimization for Instant Brown Rice Process. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Mr. Weerachet Jittanit, Ph.D. 153 pages.

Two major parts conducted in this study were drying kinetics and optimization of operating process parameters for instant brown rice production. The single-stage drying in hot air oven (HAO) and microwave oven (MWO) and second-stage drying in MWO, fluidized bed dryer (FBD) and HAO were carried out to dry the cooked brown rice samples. The MWO appeared to be a suitable dryer for producing instant brown rice due to very fast drying rate, higher moisture diffusion possibly creating the porous structure and less shrinkage of dried-cooked brown rice whilst a dense structure and collapse was found at single stage drying in HAO. The less effect of drying was found at second-stage drying in FBD for temperature range of 160-200^{o}C. Hii et al.'s model and Verma's model fitted well with the experimental data of conventional drying in HAO (single-stage and second-stage) and FBD (second-stage) whereas for MWO (single-stage and second-stage), Verma and Milikucut's model was the best fit model. Two modified models, modified Page and two-compartment, provided a wide range application for both convectional drying and microwave drying as well as a reasonable goodness of fit.

Box-Benhken design, with three factors involving water-rice ratio, microwave power level, and hot air temperature was applied to optimize the operating process parameters for color, rehydration ratio, and texture of instant brown rice. The microwave power showed the most effect on rehydration ratio whilst the ratio of water to rice affected on hardness and stickiness of rehydrated instant brown rice. All of 3 factors influenced on colour intensity of rehydrated cooked brown rice whereas microwave power level and hot air temperature showed the interaction effect on lightness. The higher operating parameters provided the higher rehydration ratio, higher lightness and lower colour intensity value. Hardness reduced as increase of water-rice ratio, microwave power and hot air temperature. Lower water-rice ratio, higher hot air temperature and higher microwave power levels resulted in less energy consumption due to the required shorter processing time. The operating parameters for optimal response were 1.58237, 595 W, 90 ^{o}C for water-rice ratio, microwave power level and hot air temperature respectively. This optimum condition provided the overall desirability of 82.3%.

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