

Water loss characteristics and process optimization of salted dried peanuts under microwave irradiation

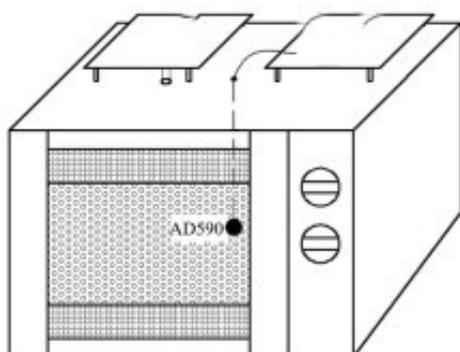
Under the condition of microwave power of 640 W, the samples were sampled 25, 50, respectively.

75g was processed by [microwave drying equipment](#), and the water loss rate of each sample was determined by 0.5min sampling. In the initial stage of microwave treatment, the maximum water loss rate of the sample is different with different loading amount. When the loading amount is 25 g, the water loss rate reaches the maximum at 0.5 min, while when the loading amount is 50 g and 75 g, the water loss rate reaches the maximum at 2 min. This is because the smaller the load, the more microwave energy absorbed by the sample, the faster the evaporation of water, so that the water loss rate quickly reached the maximum.

According to this characteristic, combined with sensory evaluation, the suitable loading quantity can be selected. While ensuring the product quality, the material handling capacity can be increased and the processing time can be reduced to maximize the process efficiency.

Response surface analysis of microwave drying process

Taking microwave power A, load B and microwave time C as independent variables, water loss rate Y 1, unit power consumption Y 2 and sensory evaluation Y 3 as response values, the response surface analysis scheme was designed by using Design Expert 7.0.1 software, and regression analysis was carried out with Box-Behnken model.



Schematic diagram of microwave drying temperature control system

Influence of various factors on water loss rate

The results showed that the total determinant R^2 of the model was 0.9963, indicating that 99.63% of the variation of water loss rate could be explained by the regression model, and the model could be used to estimate the value of water loss rate; the F value was 206.87 (P It has practical application significance. The interaction terms of microwave power, microwave time and loading amount, microwave power and loading amount, microwave power and microwave time all have significant effects on the rate of water loss in microwave drying, but the interaction terms of loading amount and microwave time are not significant. From the F value, we can see that the degree of influence of each factor is in sequence of load, microwave power and microwave time.

Effects of various factors on sensory evaluation

Because the influence of various factors on microwave drying of peanut is not a simple linear relationship, in order to clarify the effect of various factors on response value Y₃, the design expert 7.0.1 software was used to carry out multiple regression analysis on table 6 data, and the regression model was obtained.

$$Y_3 = 9.3 + 0.14A - 0.$$

0.

The equation can be used to predict the sensory evaluation of peanut final products under different microwave power, microwave time and loading conditions. When Y₃ takes the maximum value, A, B and C are optimized to get the optimal condition encoding.

0, - 0. The optimum conditions are microwave power 640W,

When the loading amount was 35.5g and the microwave time was 3.57min, the sensory evaluation score reached the maximum score of 9.66.

Optimization of 2.2.4 microwave process parameters

Under the condition that Y₂ is the smallest and Y₃ is the largest, and the drying rate of peanut is the main index in the superior range, the optimum conditions of microwave drying of salty and dry peanut are optimized by combining with the experimental results. The optimum coding values of the three factors are 1, 0.19 and -1.

That is to say, when microwave power is 800 W, loading capacity is 54.25 g, microwave treatment time

3.5 min, at this time the water loss rate is 5.79 g/ min, and the unit power consumption is 0.76 kW. H/kg, sensory score 9.17 points.

The 3 knot theory

Under the condition of different microwave power and load, the water loss of peanut fruits increased twice, which may be due to the influence of microwave drying equipment on the microstructure of peanut fruits. The maximum water loss rate of the first water loss peak of peanut fruit increased with the increase of [microwave power and loading capacity](#).

The results of response surface analysis showed that microwave power, loading capacity and microwave time had significant effects on the rate of water loss during peanut drying. Among the factors affecting power consumption, microwave power, microwave time and microwave power also have a very significant influence, and the influence degree of each factor is in turn the load, microwave time and microwave power. Among the factors affecting sensory score, the influence of power consumption reached a significant level, and the influence degree of each factor was in order of load, microwave time and microwave power.

Microwave power 800W, loading capacity 54.25g and microwave treatment time 3.5min were used to produce salty and dry peanuts. At this time, the water loss rate was 0.

5.79g/min, the unit power consumption is 0.76kW. H/kg, sensory evaluation is 9.17 points.