MICROWAVE DEHYDRATION IN THE INSTANT NOODLE

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ABSTRACT

The paper deals with an interesting application of microwave technique: food technology. The experiment uses glutinous rice flour as major raw material, corn protein, salt and water as additional material, using palm oil as surface coating of base. The optional technical conditions are glutinous rice 50g, salt 2.4g, corn protein 5g, water content 50%, palm oil 1.5% (accounting for base weight). The microwave oven's power is 500W and heating duration 2 minutes. "Microwave instant noodle" is very fresh and mysterious to most consumers. The damage of the nutritive elements in noodle by microwave dehydration is much less than that of oil-fried product. So it is possible to produce many series of products that contain different raw materials and different compositions

INTRODUCTION

Instant noodle, whose half-product is done in turn dough making press noodle, forming, steam noodle, etc, is very popular and convenient [1]. There are two methods to dehydrate the half-product, in which water content is about 30%. One is warm-air flow dehydration (heated-air drying) and the other is oil frying. The former has many disadvantages, for example, its mouth feeling and rehydration are bad. Its processing time and energy consumption are high. So, oil-frying dehydration is

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applied in most of Chinese instant noodle factories. When the oil content of instant noodle raises by 1%, the product cost will be increased at least 50,000 RMB annually in a medium production assemble. At the same time the high oil content would worse the rehydration process. In addition, the appearance of the noodle may have a bad effect on the consumers and the yellow color of the fried product will bring a bad appetite [2].

If the microwave technology is applied into the instant noodle dehydration, the problems above could be resolved. The oil content of the product will be greatly decreased while its rehydration and whiteness will be both raised. To top off it, the quality of the production can also be controlled safely [3], [4].

It can be remarked that the work conditions in the microwaves heating processes are better than in the traditional heating processes[5], [6]. There is neither dust or smoke, nor external heating. The power efficiency is larger and the quality of products is better. [7].

However, the cost of the caloric unit is larger than in the case of the traditional heating processes. The aim of this paper is to present the study of the microwave dehydration in the instant noodle

MATERIALS AND METHODS

2.1 Main raw materials

Common products: flour, edible palm fat, food additive.

2,2 Main equipments & instruments

Instant noodle production assemble line; microwave oven; blast dry oven; whiteness instrument; Saxhet's extractor; tension meter.

2.3 Experimental methods

The half-product is produced by traditional technique. The half-product in glass container is dried in microwave oven.

The water content of product before dehydration and after dehydration are measured at GB. The water content before dehydration is about 30% while the one after should be below 5%. In order to imitate warm-air flow drying product, the half-product is dried by heated-air in blast dry oven at 110 ± 5^{0}C simultaneously.

2.4 Analysis methods

Water content: China Bureau of Standard (GB) 5009.3-85;
Oil content: China Bureau of Standard (GB) 5009.3-85;
Rehydration time: China Bureau of Standard (GB) 9848-88;
Whiteness: whiteness instrument.

RESULTS AND DISCUSSION

The experimental results of product dehydration.

The water contents of product and the dehydration time in the different ways are shown in Fig. 1.

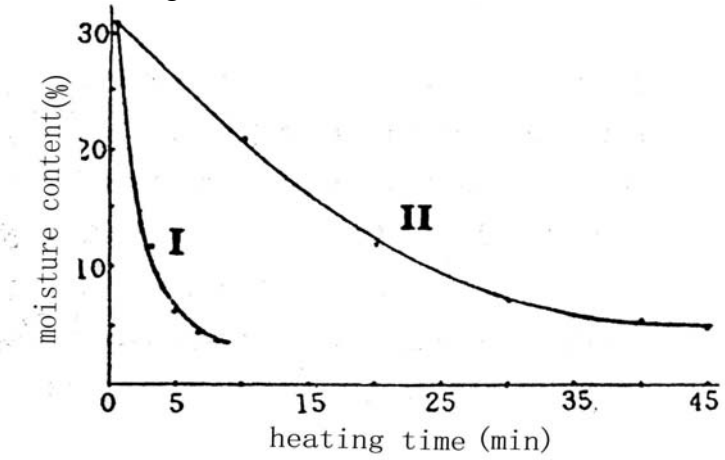

Figure 1 Moisture content with heating time curve:
I. Microwave, II. Heated-air drying

The oil content, rehydration time and whiteness are shown in table 1.

Table 1. Results of oil content, rehydration time and whiteness test

	Oil frying	Microwave	Heated-air
Oil content (%)	22.4	1.9	1.9
Rehydration (s)	300	230	400
Whiteness	55.4	59.6	58.9

The information above shows that the water content can be reduced to 5% within 8 minutes by microwave technology while the drying time is even shorter than that of one-fifth of warm-air flow dried product.

The oil content of microwave noodle is a little higher than that of raw flour oil (1.6%). The reason is that the half-product absorbs the oil on the product line.

The microwave noodle exposes to nature environment at 23^0C, 34% humidity for 2 hours is weighed (fig. 2). The results show that the product is completely dried and its rehydration is better. The microwave noodle absorbs water violently when put in boiling water and, at the same time, a great amount of gas is puffed. The noodle will be completely rehydrated within 300 seconds if the temperature is beyond 68^0C.

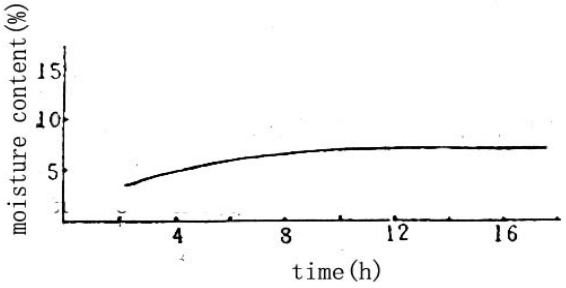

Figure 2 Microwave instant noodle hydroscopicity curve

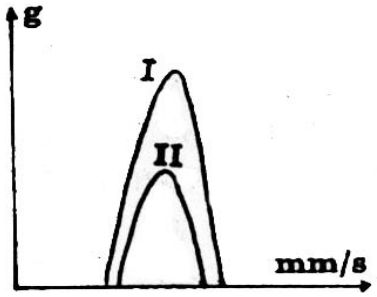

Figure 3 Tensile test curve I: microwave II: oil fried

The tendon strength of the rehydrated microwave-noodle (40min) is also measured by tension meter. The results are showed in Fig. 3. The taste panel on the spot also proves that the microwave noodle is more elastic than the oil fried product.

CONCLUSIONS AND PROSPECTS

1. The information above shows that it is completely feasible to apply microwave technology in the instant noodle dehydration.
2. The damage of the nutritive elements in noodle by microwave dehydration is much less than that of oil-fried product. So it is possible to produce many series of products that contain different raw materials and different compositions.
3. Microwave dehydration will avoid oil smoke, nutrition damage and other harmful materials that may be produced during the oil frying. The oil content can also be controlled precisely by the ingredient and the oil content in the soup blending. This will help the noodle industry to a constructive developing.
4. The people including technicians, managers etc. involved in the microwave dehydration technology must be skillful and have enough knowledge. It is good for the promotion of the food industry.
5. As for microwave dehydration, water absorbs microwave energy efficiently at 915MHz and 2450MHz [7]. The efficiency is beyond 70%, it is very prospective to apply this technology both in the home and the aboard.
6. ”Microwave instant noodle” is very fresh and mysterious to most consumers. It is also an opportunity to develop instant noodle marketing.

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ACKNOWLEDGMENT

This work was supported by the National Natural Science Foundation of China under Contract No. 29576263 & supported by Ministry of Science and Technology of the P.R.China under International Cooperation Subject No. [2001]0103, [2001]227.