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Research Note

Defatting of Whole Peanut Kernels After Infrared Heating

ABSTRACT

Oil was extracted from whole peanuts using hexane. Whole peanuts were then roasted in an oven and by infrared lamp at temperatures between 150°C and 230°C for 1 to 15 min. Peanuts (after skinning) were soaked in hexane for 36 h and extracted (Soxhlet) for 12 h. Up to about 70% of total oil was removed from the peanuts. Peanuts roasted by infrared took less roasting time and lost more oil even though the moisture content was fairly high after roasting.

INTRODUCTION

Fan *et al.* (1948) and Smith (1952) studied extraction characteristics of peanuts. Willich & Feuge (1957) tried de-oiling of whole peanuts in order to recover a useful by-product, i.e. de-oiled whole peanuts. Although some attempts were made to remove oil from peanuts by pressing without causing appreciable damage to kernels (Ramachar *et al.*, 1974; Bongirwar *et al.*, 1977), solvent extraction was studied as an alternative process (Bhuchar *et al.*, 1981; Belani & Pai, 1983). In all these studies the peanuts were roasted in ovens. In the present study, oven roasting was compared with infrared roasting.

MATERIALS AND METHODS

Analysis

Phule-Pragati variety of peanuts was analysed for moisture and fat content by AOAC methods (Anon., 1966). After roasting and defatting, moisture and fat were again determined by these methods.

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Roasting

Duplicate samples of 20 g were roasted in oven at 150°C for 15 min. An infrared lamp was used for roasting some samples at 150°, 160° and 230°C for 1 to 11 min, the temperature being controlled by adjusting the voltage by a rheostat. Roasting time was adjusted so the peanuts were roasted to a white-roast, showing no browning.

Defatting

Skin was manually removed and kernels were soaked in hexane for 36 h. Only the whole kernels were then extracted (Soxhlet) for 12 h. Defatted kernels were desolventised in the oven at 100°C for 2–3 h. Oil was recovered from miscella by distilling off the solvent.

RESULTS AND DISCUSSION

The initial moisture content and the fat content of the samples were found to be 6·30% and 45·79%, respectively.

It can be seen from Table 1 that oven roasting at previously optimised

TABLE 1
Comparison of Oil Removal and Quality of Defatted Whole Peanuts

Roasting	*Temperature* (°C)	*Time* (*min*)	*Moisture after roasting* (%)	*Oil removal* (% *of total*)	*Overall quality*
Oven	150	15	1·74	62·59	Excellent
Infrared	150	5	3·98	52·74	Good
	150	7	3·22	64·08	Good
	150	9	2·16	68·39	Excellent
	150	11	2·16	71·10	Good
Infrared	160	4	3·08	54·11	Very good
	160	5	2·72	50·97	Good
	160	6	2·42	54·72	Good
	160	7	2·17	55·12	Poor
Infrared	230	1	5·72	6·49	Poor
	230	2	4·73	70·14	Good
	230	3	3·52	75·30	Very good
	230	4	2·53	72·57	Very good

conditions (Mahajan, 1985) of 150°C and 15 min yielded about 62% oil from peanuts. The quality of these peanuts was excellent. Moisture content of the peanuts after roasting had to be fairly low in order to give such extraction and quality. The higher extraction would result in extensive cracking as was observed previously (Belani & Pai, 1983).

With infrared heating, the roasting was accomplished in a much shorter time. All the samples had a much higher moisture content (>2%) and several samples had more than 2·5% and even 3%. Samples higher than 4% moisture did not yield a high quality product whereas the sample with 5·72% moisture could not be defatted. Generally when roasting temperatures were 150° and 230°C, the oil recovery was inversely related to moisture content. At 160°C, however, neither the oil recovery was good nor was there any relationship between recovery and moisture content.

The mass transfer phenomenon has been discussed earlier to describe the oil removal by solvent extraction of peanuts (Fan *et al.*, 1948). Oil removal depends on moisture content as well as cell wall disruption, which facilitates solvent penetration. Both are achieved by roasting. Oven roasting, although effective, is too lengthy and causes extensive surface cracking after oil removal as observed by Belani & Pai (1983). The cracks are also due to very low moisture content.

Infrared roasting probably caused sufficient cell disruption without excess moisture loss. This resulted in good oil recovery with very good to excellent quality of defatted kernels.

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