

EFFECT OF SLICE MOISTURE ON THE QUALITY OF POTATO CHIPS

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ABSTRACT

Effect of pre-frying dehydration on the potato chips' quality was studied. Potato slices of 1.5 mm, thick were blanched in boiling water for 1.5 min, dipped into 1000 ppm sulphur dioxide solution containing 2% NaCl and 0.2% citric acid for 15 min and dehydrated to 72%, 58%, 44% and 26% moisture contents at 50° C in a cabinet dryer. The fresh (undehydrated) slices were taken as control. The dehydrated slices were fried in refined soyabean oil, packaged in polyethylene bag and analysed for appearance, texture and oil content of the chips.

Results indicated that the effect of slice moisture on the appearance, texture and oil content of the potato chips was significant ($p < 0.05$). It was concluded that the potato chips of better texture and appearance with minimum oil content of 29.54%, could be prepared by partial dehydration of slices to 44% me before frying.

INTRODUCTION

Potato production and consumption is very high in Nepal. It is one of the vegetables from which numerous products can be prepared. Potato chips is one of the largely produced and preferred snack items by all ages of consumers. It is apparent that a high quality product never fails to sell. Quality of chips may be defined as a combination of attributes that are significant in determining the acceptability of the product. The major factors of interest are yield, colour, texture, oil content, flavour, and shelf life of the chips (Talbert and Smith, 1975).

Potato chips during frying absorbs 30% to 50% of oil. The oil, being an expensive raw material is an important factor in determining the cost of the chips. The oil content is a very important factor to the chips processors. High oil content not only adds to the cost of the chips production but also renders the chips oily, highly susceptible to rancidity and thus less desirable to the consumer, where as chips with very low oil content is also undesirable as it lacks flavour and seems harsh in texture (Sandu & Bawa, 1993). Hence, it is necessary to maintain a level of oil which is appropriate in every aspects. The chips with low oil content can be manufactured by using potatoes of high specific gravity (Smith, 1951; Kunkel et al., 1951), controlling slice thickness (Smith, 1951),

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partial drying prior to frying (Smith, 1951; Gamble and Rice, 1978), and using less frying time (Reddy & Das, 1992). The present investigation was carried out

to study the effect of partial dehydration of slices on the texture, appearance, and oil content of the potato chips.

MATERIALS AND METHODS

Large and oval shaped potatoes (T. 0012 Red var.) with shallow eyes few in numbers were collected from local market of Dharan. They were washed, peeled by abrasive peeler and dipped into 2% NaCl solution. The peeled potatoes were sliced to 1.5 mm thick; by a hand operated potato slicer, blanched in boiling water for 1.5 min, cooled and dipped in 1000 ppm sulphur dioxide solution containing 2% NaCl and 0.2% citric acid for 15 min. The slices were drained and dehydrated to 72%, 58%, 44% moisture contents at 50° C in a cabinet dryer. The fresh (undehydrated) slices were taken as control. Both the control and dehydrated slices were fried in refined soyabean oil, packaged in polyethylene bags and analysed for oil contents, texture and appearance of the chips.

ANALYTICAL METHOD

The moisture content was determined by oven method (Ranganna, 1986). The oil content was determined according to Lulai and Orr (1979). Sensory evaluation of the chips was carried out by using nine-points hedonic scale (Ranganna, 1986), in which eighteen semi-trained panelists were asked to evaluate the products in terms of texture and appearance. All the determinations were carried out in triplicates.

STATISTICAL ANALYSIS

The data were subjected to one-way ANOVA in a completely randomized design. All the significant tests were performed at 95% significant level (i.e. $p = 0.05$) and the means were compared by LSD (Gomez & Gomez, 1984).

RESULTS AND DISCUSSION

Effect of slice moisture on the appearance and texture of potato chips is shown in Fig. - 1. The average score for appearance increased with decreasing slice moisture and reached maximum (7.44) at 44% and 58% moisture content. Further reduction in moisture below 44% markedly decreased the appearance preference. Similarly, the texture preference also increased with decrease in moisture from 83% (fresh) to 58% but further dehydration below 58% moisture markedly impaired the texture. A maximum and minimum texture scores of 8.27 and 6.4 were obtained at moisture contents of 58% and 83% respectively. The

pre-frying slice moisture content showed profound effect on the texture than that on appearance of the potato chips.

Statistically the treatment had a significant effect ($p < 0.05$) on the appearance and texture of the chips. Furthermore, LSD showed that chips prepared from slices containing 72%, 58% and 44% moisture were not significantly different in appearance. Likewise, chips made from 72% moisture content slices did not differ in appearance over the control. But the preference for appearance decreased significantly ($p < 0.05$) for chips made from 26% moisture content slices of all the samples evaluated. Similarly, the texture of the chips prepared from 72%, 58%, 44% and 26% moisture content slices were significantly better than control; whereas chips made from 58%, 44% and 26% mc slices were not different in texture.

The pre-fried slices with high moisture content took higher amount of oil during frying (Fig. - 2) rendering chips oily in appearance thus affecting the overall preference, while a lower moisture content of slices led to less oil absorption, resulting in chips lacking in flavour and crispness. Analogous results were also reported by Talburt and Smith (1975), and Gamble and Rice, (1987).

It was found that partial dehydration of chips from 58% to 44% moisture content can produce chips of better appearance and texture.

The effect of slice moisture on the oil content of the chips is depicted in Fig. - 2. The oil content decreased steadily with decrease in moisture. The maximum and minimum oil contents of 51.02% and 24.32% were found for chips made from 83% (fresh) and 26% moisture content slices respectively. Statistically, Pre-fried slice moisture content had a significant effect ($P < 0.05$) on the chips oil uptake during frying. Moreover, LSD indicated that the oil content of all the samples were significantly different. Similar results were also found by Smith (1951).

Oil, being an expensive raw materials the cost of chips production becomes very high if the slices were fried fresh, mainly due to high oil uptake during frying (Fig. - 2). In addition to this, the flavour of the chips is also not acceptable. Although the oil content of chips can be reduced significantly by reducing the slice moisture content below 44% prior to frying (Fig. - 2), the quality of the chips both in terms of appearance and texture is impaired seriously and hence it does not seem beneficial to partially dehydrated slices below 44% moisture content. Therefore, pre-frying dehydration of slices to 44% moisture greatly improved the appearance and texture of chips as well as substantially reduced the oil consumption during frying.

CONCLUSION

The pre-frying slice moisture content had a significant effect ($p < 0.05$) on the appearance, texture and oil content of potato chips. Partial dehydration of slices from 58% to 44% moisture substantially improved the chips. Partial dehydration of slices from 58% to 44% moisture substantially improved the chips appearance and texture. Furthermore, chips oil contents decreased with decrease in slice moisture. It was concluded that chips made from 44% moisture content slices was superior in terms of appearance, texture and oil contents of the samples studied.

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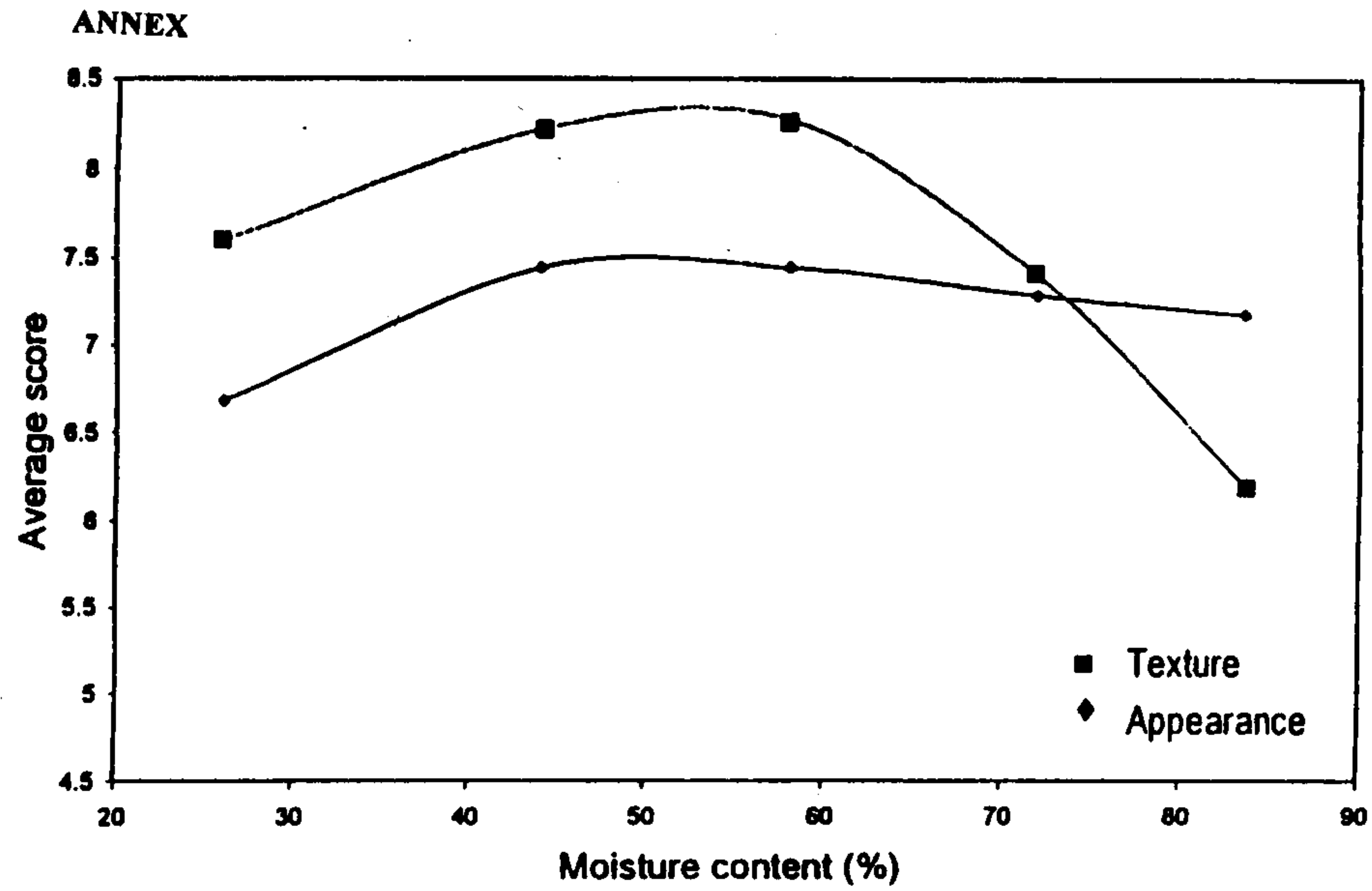


Figure - 1: Changes in appearance and texture of chips with moisture content of pre-fried slices

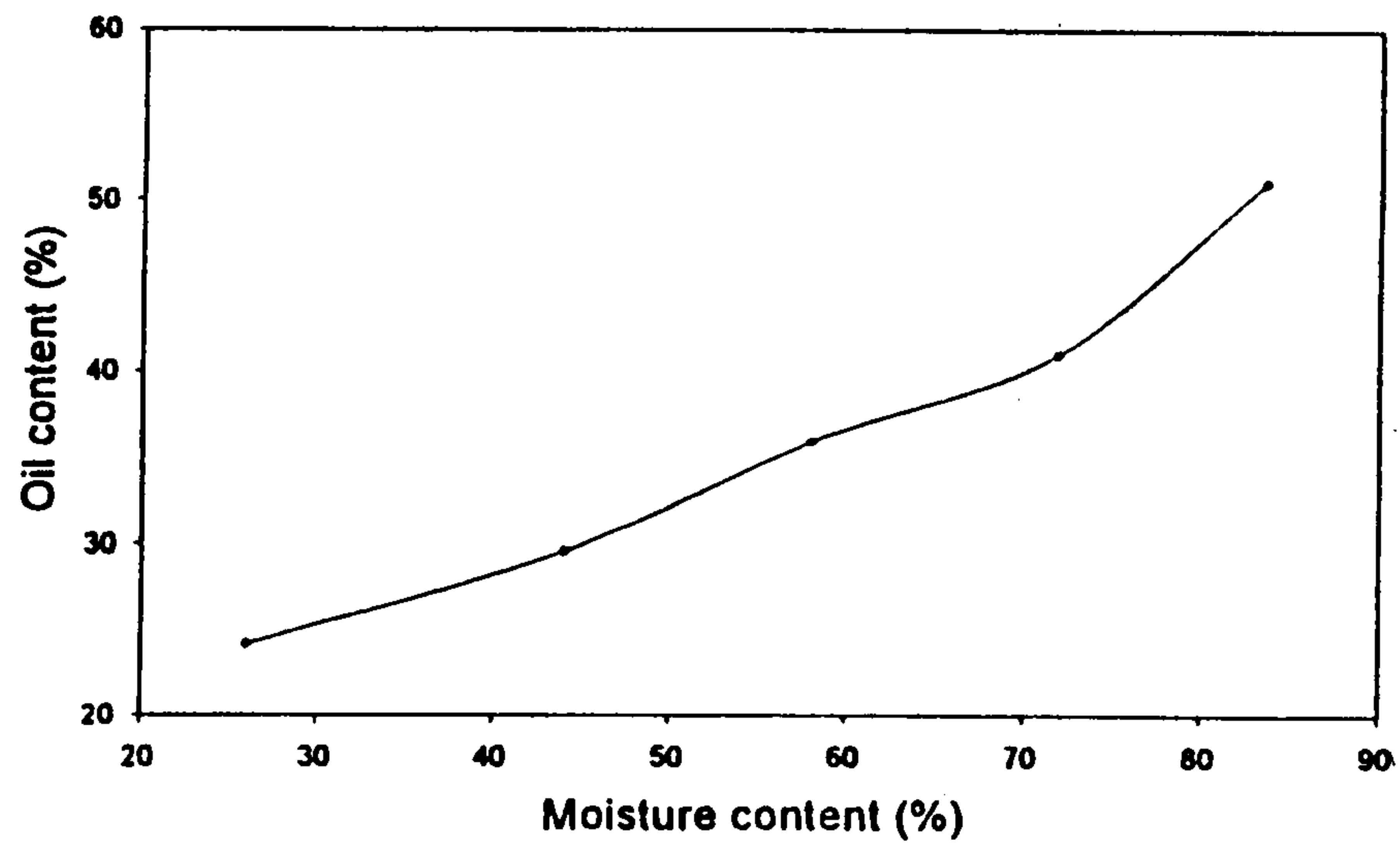


Figure - 2: Changes in chips oil content with moisture content of potato slices.