ABSTRACT

The wheat-soy cold extrudate prepared by adding 7.5% soy flour and 0.5384 kg/kg dm initial moisture content could be optimally steamed at 70 kPa for 10.75 min, and HTST air puffed at 215 °C for 30 s followed by oven toasting at 113 °C for 27 min to prepare wheat-soy RTE snack foods. Similarly, the rice-soy cold extrudate prepared by adding 5.0 % soy flour and 0.60 kg/kg dm initial moisture content could be optimally steamed at 70 kPa for 9.75 min, and HTST air puffed at 224 °C for 28 s followed by oven toasting at 115.50 °C for 25.25 min to prepare rice-soy RTE snack foods. During the process of preparation of HTST air puffed RTE snack foods, the biochemical changes were minimum except in fat content that reduced by about 65 % during cold extrusion. The final product was having moisture content about 0.045 to 0.050 kg/kg dm. The calorific value of optimally developed RTE snack foods was about 380 kcal/100 g. The mass transfer study revealed that the Page's Model could be best fitted to moisture removal behaviour with puffing time at puffing temperature of 200 to 240 °C in both the cases. The activation energy was determined as 1896.54 and 1732.612 kJ/kg for wheat-soy and rice-soy snack foods, respectively during HTST air puffing for temperature range 200 to 240 °C. During HTST air puffing, initially heating of product for first 8 to 10 s, caused surface moisture removal leading to case hardening followed by phase conversion of entrapped moisture into vapours. This caused initiation of puffing. Further heating caused pressure built up inside the puffing product leading to development of cracks along the puffing wall of product, escaping the vapours. This was evidenced in micro structural view of the puffing product and pattern of moisture removal and change in temperature of product. The surface heat transfer coefficients, calculated using Colburn factor, were ranged from 130.244 to 122.752 W/m^2 °C for wheat-soy and from 125.600 to 118.374 W/m^2 °C for rice-soy snack foods, decreasing significantly with increase in puffing air temperature from 200 to 240 °C. The product temperature attained by wheat-soy snack foods was about 110-111 °C and that for rice-soy snack foods was about 103-104°C to initiate puffing effect. The sensory evaluation indicated that the HTST air puffed RTE snack foods applied with commercially available spice named as *chat masala* were comparable with commercially available similar snack foods. These could be well stored in Metallic polyester (35 micron) package at moderate RH (65%) and ambient temperature of 30°C, for considerably long shelf life of 245 and 234 days, respectively.

Keywords: HTST, Puffing, RTE snack, Wheat, Rice, Soy, cold extrudate, heat and mass transfer