

Drying characteristics and quality change of unutilized-protein rich-tomato pomace with and without osmotic pre-treatment

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Abstract: Commercial processing of tomato utilizes only juice, while the wet pomace is considered merely as a waste product. However, tomato pomace represents a very significant source of lycopene, lipids, ascorbic acid, fibers, and proteins. High protein and lysine content tomato seeds, a major part of the pomace waste, are an unexplored source of non-conventional oil which possesses properties similar to conventional oils. However, tomato pomace is highly perishable in its fresh state because it contains about 95% moisture. Therefore, it is just dumped and allowed to decay, causing a serious environmental problem and a waste of resources. Tomato pomace must be dried immediately to reduce moisture before microbial spoilage and mold develop. The aim of this work was to investigate the effect of temperature and osmotic dehydration on air drying kinetics of tomato pomace, and assess the ability of selected drying models to quantify the moisture removal behaviour in tomato pomace over the range of temperatures normally encountered in industrial dryers for the purpose of simulation, scaling up of the process and saving energy. In general, increasing drying-air temperature increases drying potential and consequently decreases process time. Osmotic pre-treatment was found to be effective for enhancing drying rate and reducing drying time by approximately 30%. The effective moisture diffusivity varied from 0.3×10^{-9} to $2.6 \times 10^{-9} \text{ m}^2/\text{s}$ in the temperature range (40–80 °C). The effective moisture diffusivities of NaCl-treated samples dried at 60 °C was $1.1 \times 10^{-7} \text{ m}^2/\text{s}$ (80 times higher than untreated samples). The temperature dependence of the effective diffusivity was described by the Arrhenius relationship with an activation energy of 52.1 kJ/mol. Colour analysis showed that the values of the colour parameters (L^* , a^* , b^* and h^*) increased with drying temperature made the colour of the pomace samples brighter, shifting it towards yellow and red. Pre-treatment with NaCl had a