

Ohmic Heating behaviour and Electrical Conductivity of Grape Juice

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Abstract—*Ohmic heating is an advanced thermal food processing technique. It is an electrical resistance heating resulting from the passage of electrical current through food materials offering some resistance. Wide range of studies is required to deepen the knowledge of the ohmic heating process for applying the technology to different food products. Grapes are rich sources of polyphenolic compounds, antioxidants, and many nutraceuticals which demonstrates numerous health benefits. An ohmic heating device was developed to determine the heating behaviour and electrical conductivity of grape juice under different ohmic heating conditions. Grape juice was tested in the device at four levels of voltage gradients (10, 20, 30 and 40 V cm⁻¹) and four levels of heating temperatures (55, 65, 75 and 85 °C). It was found that temperature and heating rate of grape juice increased linearly with the voltage gradient. The highest heating rate was recorded for 40 V cm⁻¹ at 75 °C. Electrical conductivity of grape juice linearly increased with temperature and voltage gradient. Maximum value of electrical conductivity of grape juice was 0.81 S m⁻¹ at 30 V cm⁻¹ at 85 °C. Bubbling was observed at 75 °C at 40 V cm⁻¹. System performance coefficient decreased with increasing voltage gradient and heating temperature. System performance coefficients of developed ohmic heating device were in the range of 0.57-0.99.*

Keywords: *Ohmic heating, grape, electrical conductivity, bubbling, system performance coefficient.*