AN INFRARED THERMAL IMAGING STUDY OF MICROWAVE HEATING OF FOODS

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The microwave ovens are domestic equipments often used as an alternative to conventional heating of foods. However, this heating inside the microwave cavity seems to be heterogeneous leading to different temperatures throughout the food. In this way, some devices such as the turntable are used to minimize this effect, but cannot eliminate it. Therefore, a study of heating pattern of some foods was proposed by the use an infrared thermal imaging camera (FLIR model SC-305, 0.05 ºC resolution, 8-13 µm). This equipment was used to measure the infrared energy radiation emitted by the objects and allowed the identification of areas with greater or lower wave's incidence. The influence of turntable, food position inside the cavity (using a milk cup, 30 mL) and food size (using cheese cubes with 2, 5, 7, 10, 15 and 20 mm) was evaluated at maximum power (697 W) by 10 s. It was observed that the heating efficiency was better for foods with lower surface-area ratio (0.3 mm). Without turntable rotation, the horizontal distribution was very heterogeneous (Tmin = 25.6 ºC and Tmax = 40.4 ºC), and it was possible to visualize standing waves, responsible for the cool and hot spots. When the milk was placed in the borders of the turntable, it was noticed a gradient temperature of about 8 ºC between the bottom and the upper part of flask. These results confirm the usefulness of infrared thermal imaging as a tool for evaluation of heterogeneity of heating with microwaves.