



Experimental investigation of different-shaped microwave-heated potatoes: thermal and quality characteristics analysis for food preservation

Deepak Singh¹ · Sunita Singh² · Suresh Kumar Patel¹ · Shishir Sinha³ · Raj Kumar Arya⁴ · Dhananjay Singh¹

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Abstract

Food materials are consumed for nutritional purposes in the form of fruits, vegetables, plants, and meat. These contain proteins, carbohydrates, and other useful nutritional compounds and these processed foods are a rich source of nutrition. The demand and supply of hygienic food for a particular population is possible only by food preservation. It can be done by various methods such as drying, freezing, chilling, chemical preservation, and pasteurization. Drying is a method of food preservation and it can be done by solar drying, microwave heating, vacuum drying, and some other methods. Microwave heating is a fast-drying method. It utilizes electrical energy to generate heat energy. The domestic microwave oven is not harmful but a commercial-level oven may be little bit harmful, when operated on high frequency. Potato is used as a sample material with different shapes such as slab, cylindrical, and spherical. The microwave oven has been operated at four different microwave powers such as 100 W, 300 W, 600 W, and 800 W. Slab-shaped (30 °C), cylindrical-shaped (31.5 °C), and spherical-shaped (30.5 °C) food materials achieved maximum temperatures of 83.9 °C, 110.6 °C, and 146.1 °C respectively. The temperature variations and drying characteristics of the food samples have been monitored. An oven has achieved maximum drying efficiency of 25.65% with a slab-shaped sample. For the detection of the cracks and chemical compositions in the food samples, SEM with EDS analysis has been performed. Economic analysis of microwave oven has also been done and payback period has been found as 3.27 years.

Keywords Food preservation · Drying characteristics · Microwave · SEM · Economic analysis

Responsible Editor: Philippe Garrigues

✉ Dhananjay Singh
dsa768008@gmail.com

Deepak Singh
dsdeepaketawah8@gmail.com

Sunita Singh
sunita.pharma80@gmail.com

Suresh Kumar Patel
suresh.ieju@gmail.com

Shishir Sinha
shishir@ch.iitr.ac.in

Raj Kumar Arya
aryark@nitj.ac.in

¹ Department of Chemical Engineering, Institute of Engineering & Technology, Lucknow, UP, India

² Department of Pharmacy, Rameshwaram Institute of Technology & Management, Lucknow, UP, India

³ Department of Chemical Engineering, Indian Institute of Technology, Roorkee, UK, India

⁴ Department of Chemical Engineering, National Institute of Technology, Jalandhar, Punjab, India