

## Some physical properties of Pistachio (*Pistacia vera* L.) nut and its kernel

M. Kashaninejad<sup>a,\*</sup>, A. Mortazavi<sup>b</sup>, A. Safekordi<sup>c</sup>, L.G. Tabil<sup>d</sup>

<sup>a</sup> Department of Food Science and Technology, Gorgan University of Agricultural Sciences and Natural Resources, Beheshti Avenue, Gorgan 49138-15739, Iran

<sup>b</sup> Department of Food Science and Technology, Ferdowsi University, Mashad 91775-1163, Iran

<sup>c</sup> Chemical and Petroleum Engineering Faculty, Sharif University of Technology, Tehran 11365-9465, Iran

<sup>d</sup> Department of Agricultural and Bioresource Engineering, University of Saskatchewan, 57 Campus Drive, Saskatoon, SK, Canada S7N 5A9

Received 19 January 2004; accepted 9 November 2004

Available online 8 January 2005

### Abstract

Some physical and aerodynamic properties of pistachio nut and its kernel were determined in order to design processing equipment and facilities. In this study, several physical properties of pistachio nut and its kernel were evaluated as a function of moisture content in the range of 4.10–38.10% (w.b.). The length, width, height, shell splitting and unit mass of pistachio nut ranged from 16.07 to 17.25 mm, 12.41 to 12.75 mm, 10.98 to 12.24 mm, 3.59 to 4.47 mm and 0.90 to 1.30 g respectively as the moisture content increased. The respected value for pistachio kernel varied from 15.21 to 16.22 mm, 9.11 to 10.53 mm, 8.73 to 9.66 mm and 0.51 to 0.80 g, respectively. In pistachio nut, the sphericity decreased from 80.83 to 80.71%; the geometric mean diameter increased from 12.97 to 13.90 mm; bulk density increased from 465.38 to 576.20 kg/m<sup>3</sup>; true density decreased from 1180.75 to 1102.78 kg/m<sup>3</sup>; porosity decreased from 60.59 to 47.75%; terminal velocity increased from 7.19 to 7.93 m/s and the coefficient of static friction increased linearly against all the tested surfaces as the moisture content increased. In pistachio kernel, the sphericity increased from 70.06 to 72.87%; the geometric mean diameter increased from 10.65 to 11.81 mm; bulk density increased from 523.48 to 545.52 kg/m<sup>3</sup>; true density increased from 1082.73 to 1087.98 kg/m<sup>3</sup>; porosity decreased from 51.65 to 49.86%; terminal velocity increased from 6.45 to 7.32 m/s and the coefficient of static friction increased linearly against all the tested surfaces as the moisture content increased.

© 2004 Elsevier Ltd. All rights reserved.

**Keywords:** Pistachio nut; *Pistacia vera* L.; Kernel; Physical properties

### 1. Introduction

Pistachio nut (*Pistacia vera* L.) is one of the popular tree nuts. Several species of the genus *Pistacia* are referred to as pistachio, but only the fruits of *P. vera* attain a large enough size to be acceptable to consumers as edible nuts (Shokraii & Esen, 1988). Pistachio is cultivated in the Middle East, United States and Mediterra-

nean countries. There has been a dramatic increase in production of pistachio nuts in these countries during the past 20 years. Iran is one of the biggest producer and exporter of pistachio nuts. It has produced more than 250,000 tonnes in 2003 and exported 115,335 tonnes to different countries in 2002 (FAO, 2003).

Pistachio kernels are a good source of fat (50–60%) and contain unsaturated fatty acids (linoleic, linolenic and oleic acids), essential for human diet (Maskan & Karatas, 1998; Shokraii, 1977). It is consumed in confectionery and snack foods. The shell (endocarp) of pistachio nuts split along their sutures which is a desirable

\* Corresponding author. Tel./fax: +98 171 4426432.

E-mail address: [kashani@gau.ac.ir](mailto:kashani@gau.ac.ir) (M. Kashaninejad).