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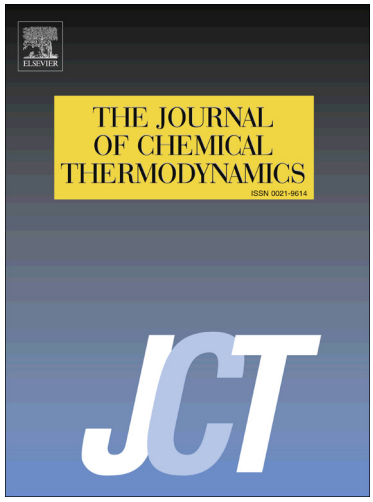

Critical properties, heat capacities, and thermal diffusivities of four saturated triglycerides

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Critical properties, heat capacities, and thermal diffusivities of four saturated triglycerides

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Abstract

The critical temperatures, pressures, heat capacities, and thermal diffusivities of saturated triglycerides $C_3H_5[C_nH_{2n-1}O_2]_3$ with n = 8, 10, 12, 14 have been measured. The experimental critical constants of triglycerides have been compared with those calculated using the group contribution methods of Constantinou and Gani, Marrero and Gani, Hukkerikar and co-workers, and Cunico and co-workers. The heat capacities and thermal diffusivities have been measured in the temperature range from about the melting point of a triglyceride to 410-425 K. The temperature dependencies of the heat capacities and thermal diffusivities have been approximated by a third-order and a first-order polynomial, respectively. The coefficients of these polynomials have been given. Using the experimental data, the thermal conductivities of triglycerides have been calculated.

Keywords: Critical properties; Heat Capacity; Thermal Diffusivity; Measurements; Triglycerides.

1. Introduction

Biodiesel is well known to be produced through the esterification reaction from vegetable oils and animal fats which mainly consist of triglycerides. Information about thermophysical properties of triglycerides is required for optimized biodiesel fuel production. The list of such properties includes but is not limited to the critical properties, vapor pressures, thermal conductivities, and heat capacities [1,2]. In this paper, we present the results of the measurement of the critical temperatures, critical pressures, heat capacities and thermal diffusivities of four saturated triglycerides: glyceryl trioctanoate (tricaprylin, CASRN 538-23-8), glyceryl tridecanoate (tricaprin, CASRN 621-71-6), glyceryl tridodecanoate

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