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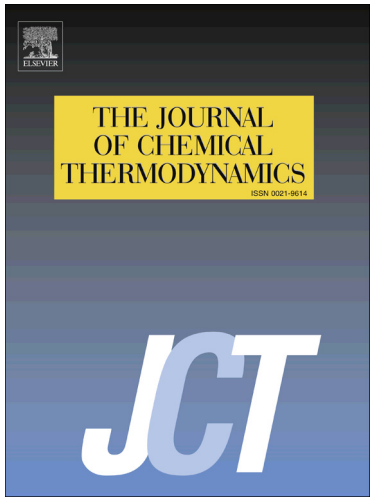

Heat capacities and thermal diffusivities of some n-alkanoic acid methyl esters

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ACCEPTED MANUSCRIPT

Heat capacities and thermal diffusivities of some n-alkanoic acid methyl esters

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Abstract

The heat capacities and thermal diffusivities of n-alkanoic acid methyl esters $C_nH_{2n-1}O_2CH_3$ with *n* from 6 to 12 have been measured. The heat capacities have been measured in the temperature range from 303.15 K to 373.15 K; the measurements of thermal diffusivity have been carried out for a given methyl ester from 303.15 K to the temperature at which a noticeable evaporation of the ester took place. The temperature dependencies of the heat capacities and thermal diffusivities have been approximated by a third-order and a first-order polynomial, respectively. It has been shown that the dependence of the molar heat capacity on *n* (*n* = 1–14) at a temperature of 298.15 K is close to linear.

Keywords: Heat Capacity; Thermal Diffusivity; Measurement; Alkanoic Acid Methyl Esters.

1. Introduction

Methyl esters of n-alkanoic acids form an important homologous series. In recent years interest in the properties of these esters has considerably increased because they are the components of biodiesel. The critical temperatures and pressures of n-alkanoic acid methyl esters were measured by us previously [1]. In this paper, we present the results of the measurement of heat capacities and thermal diffusivities of seven n-alkanoic acid methyl esters: methyl hexanoate, Chemical Abstracts Service Registry Number 106-70-7), methyl heptanoate (106-73-0), methyl octanoate (111-11-5), methyl nonanoate (1731-84-6), methyl decanoate (110-42-9), methyl undecanoate (1731-86-8), and methyl dodecanoate (111-82-0).

As a rule, biodisel fuels contain n-alkanoic acid methyl esters $C_nH_{2n-1}O_2CH_3$ with even *n* from 6 to 24 [2]. However, for completeness, we will discuss thermophysical properties of methyl esters of

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