

THERMAM 2019

**6th International Conference on Thermophysical and
Mechanical Properties of Advanced Materials
&**

**8th Rostocker Symposium on Thermophysical
Properties for Technical Thermodynamics**

22-24 September 2019

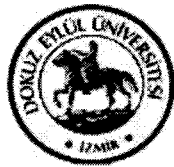
Altin Yunus Resort & Thermal Hotel, Cesme - Izmir / Turkey

Abstracts & Full Text Proceedings

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CONTENTS

ORGANIZING COMMITTEE	II
CONGRESS SECRETARY	II
SCIENTIFIC COMMITTEE	III
PREFACE	V
ABSTRACTS	X
KEYNOTE ABSTRACTS	1
Grooved Heat Pipes: Modeling, Experimentation and Applications	1
Experimental-Theoretical Parametric Analysis in Micro Scale Transport Phenomena: Application to Biodiesel Synthesis in Micro Reactors	2
The Models With Accounted Disturbance Effects For the Measurement of Thermophysical Properties of Materials by Transient Methods.....	3
Computational Modeling of Foam Effective Thermal Properties/ Review And Recent Advances	4
Hybrid Integral Transforms in Nonlinear Heat and Mass Transfer.....	5
Newer, Simple and Effective Approaches for Predicting Viscosity of Binary, Ternary and Multicomponent Liquid Mixtures	6
Inverse Method Based on Analytical Transfer Functions to Study a Thermomechanical Problem.....	7
Thermophysical Properties of Ionic Liquids at High Pressures and Temperatures.....	8
ORAL ABSTRACTS	9
Determination of the Optimum Operating Parameters of a Cascade Cooling System Using the R245fa (1,1,1,3,3- Pentafluoropropane) Refrigerant	10
Effect Of Fullerenes C60 On Heat Capacity, Density, Thermal Conductivity And Viscosity Of Tetralin	11
Temperature And Concentration Dependencies Of Density And Viscosity For The Fullerene C ₆₀ Solutions In O-Xylene.....	12
Thermal Diffusivity Measurements of Phase Change Materials in the Liquid Phase for Latent Thermal Energy Storage	13
Heating Characteristics of Cherry Juice in an Inductive Heat Exchanger.....	14
Characteristics of Free Surface Vortex Flows Under Effects of Rotation and Buoyant- Thermocapillary Convection	15

Temperature And Concentration Dependencies Of Density And Viscosity For The Fullerene C₆₀ Solutions In O-Xylene

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Nowadays application of nanotechnology is one of the most promising ways to improve the efficiency of energy equipment. The additives of nanoparticles increase the thermal conductivity, saturated vapor pressure, decrease the surface tension and may enhance the heat transfer processes with and without phase change. Moreover, it has been shown that nanoparticles like fullerenes contribute to the reduction of the friction in the mating parts and increase the energy efficiency of the vapor compression refrigeration machines [1]. However, despite these advantages, the prospects of fullerenes usage in power equipment remain insufficiently studied. The temperature and concentration dependences of density and viscosity of the solutions containing fullerenes at low concentration remain insufficiently studied. Furthermore, physical mechanisms behind those effects have not been fully studied.

This study presents an experimental results for the density and viscosity of o-xylene/fullerenes C₆₀ solutions. The experiments were carried out in the temperature range 280-350 K and concentrations up to 0.47 mass%. The density measurements of were carried out using a variable volume pycnometer with an uncertainty of $\pm 0.0010 \text{ cm}^3$ (0.13%). The viscosity was measured by the capillary viscometer with a suspended level with an uncertainty of 0.5%.

The performed analysis indicate to a similarity between the concentration dependence of the density and viscosity of the investigated samples. At the concentrations up to 0.05 mass%, the density and viscosity of the solutions o-xylene/fullerenes C₆₀ decreases as compared to pure o-xylene (on isotherms). At the concentrations of fullerenes higher than 0.05%, the density and viscosity of the solutions o-xylene/fullerenes C₆₀ increases.

Based on the experimental results, we can conclude that the concentration dependence of the density and viscosity of the solutions o-xylene/fullerenes C₆₀ is determined by two factors: fluctuational (up to 0.05 mass% of fullerenes) and concentrational (when concentration of C₆₀ is higher than 0.05 mass%).

1. Ku B.C., Han Y.C., Lee J.E., Lee J.K., Park S.H. Tribological effects of fullerene (C₆₀) nanoparticles added in mineral lubricants according to its viscosity // *Int. J. Precis. Eng. Man.* 2010. Vol. 11. P. 607-611.