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Liquid densities for *n*-decane + *p*-xylene mixtures from 293.15 K to 363.15 K at pressures up to 60 MPa

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1 **Liquid densities for *n*-decane + *p*-xylene mixtures from 293.15 K to**
2 **363.15 K at pressures up to 60 MPa**

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7 **ABSTRACT:** The experimental measurements for liquid densities of *n*-decane and *p*-xylene
8 binary mixtures were performed over the entire composition with a high-pressure vibrating-tube
9 densimeter. The temperature ranges for the present measurement were from 293.15 K to 363.15 K
10 and the pressures were reached to 60 MPa. The experimental uncertainty is estimated to be 0.001
11 with 0.95 confidence level. Experimental density values were fitted by the modified
12 Tammann–Tait equation. The PC-SAFT equation of state and Cibulka's equation was used to
13 predict the densities of *n*-decane and *p*-xylene and its mixtures. In addition, derived volumetric
14 properties, such as the excess molar volumes, the isothermal compressibility, and isobaric thermal
15 expansivity, were calculated from the experimental density data. The effects of pressure and
16 temperature on the derived properties were also discussed.

17 **Key words:** *n*-decane, *p*-xylene, high-pressure density, volumetric properties

18 **1. INTRODUCTION**

19 Hydrocarbons (for example, *n*-alkanes, iso-alkanes, naphthenes and aromatics) are the main
20 components of crude oil. Densities of hydrocarbons and its mixtures at reservoir conditions are
21 indispensable for accurate assessment of the recoverable petroleum amount within a reservoir.
22 Furthermore, the knowledge of accurate *ppTx* data of mixtures allows calculating the derived
23 properties, including excess molar volumes, isothermal compressibility, isobaric thermal
24 expansivity, and internal pressure. These properties can provide a good understanding the nature
25 of molecular interactions of the mixtures.

26 Literature survey shows that there has a great deal of density data for alkane mixtures and
27 alkane/naphthene mixtures¹⁻¹¹. However, *ppTx* properties of alkane/aromatics mixtures are still
28 scarce in the literature, especially at high pressures. Kapoor and Rattan reported densities for

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