Influence of Urea on Shifting Hydrophilic to Hydrophobic Interactions of $Pr(NO_3)_3$, $Sm(NO_3)_3$, and $Gd(NO_3)_3$ with BSA in Aqueous Citric Acid: A Volumetric, Viscometric, and Surface Tension Study

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Table S1. Comparison of Density ρ, viscosity η, and Surface Tension γ, of Liquids with Literature values at T = 298.15 K and p = 0.1 MPa

	Literature	Experimental	Percentage deviation
1.27 mol·kg^{-1} aqueous sucrose			
ρ/10^3 kg·m^{-3}	1.127374[1]	1.127287	0.01
η /10^{-3} kg·m^{-1}·s^{-1}	2.7164[1]	2.7268	0.38
DMSO			
γ/mN·m^{-1}	42.70[2]	42.33	0.86

Table S2. Transfer Apparent Molar Volumes ($\Delta_{tr}V_{\phi}^{0}$/10^{-6} m^3·mol^{-1}) of $Ln(NO_3)_3$ from WC to WCB, WCU, and WCUB

	WCB-WC	WCU-WC	WCUB-WCU	WCU-WC
$Pr(NO_3)_3$	-101.43	-38.58	-76.48	-115.06
$Sm(NO_3)_3$	-112.26	-69.32	-67.43	-136.75
$Gd(NO_3)_3$	-105.58	-85.53	-62.90	-148.43

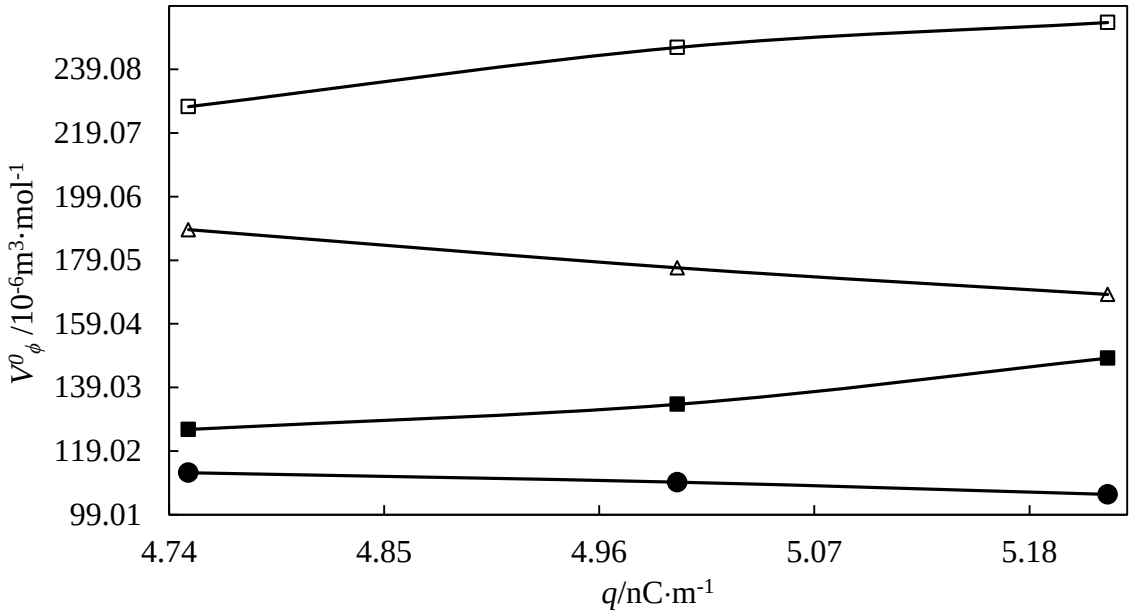

Figure S1. Effect of charge density of Ln^{3+} on limiting apparent molar volume, V_ϕ^0, with WC (□), WCU (Δ), WCB (■), and WCUB (●) at T = 298.15 K

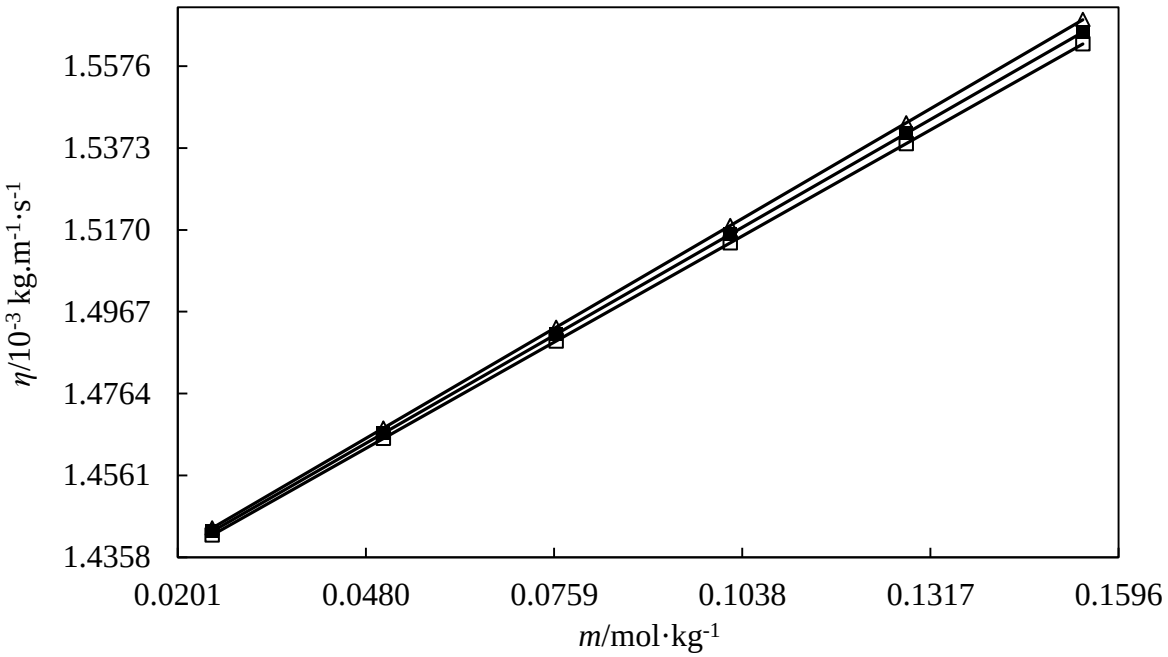

Figure S2. Effect of concentration on viscosity of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WC at 298.15 K

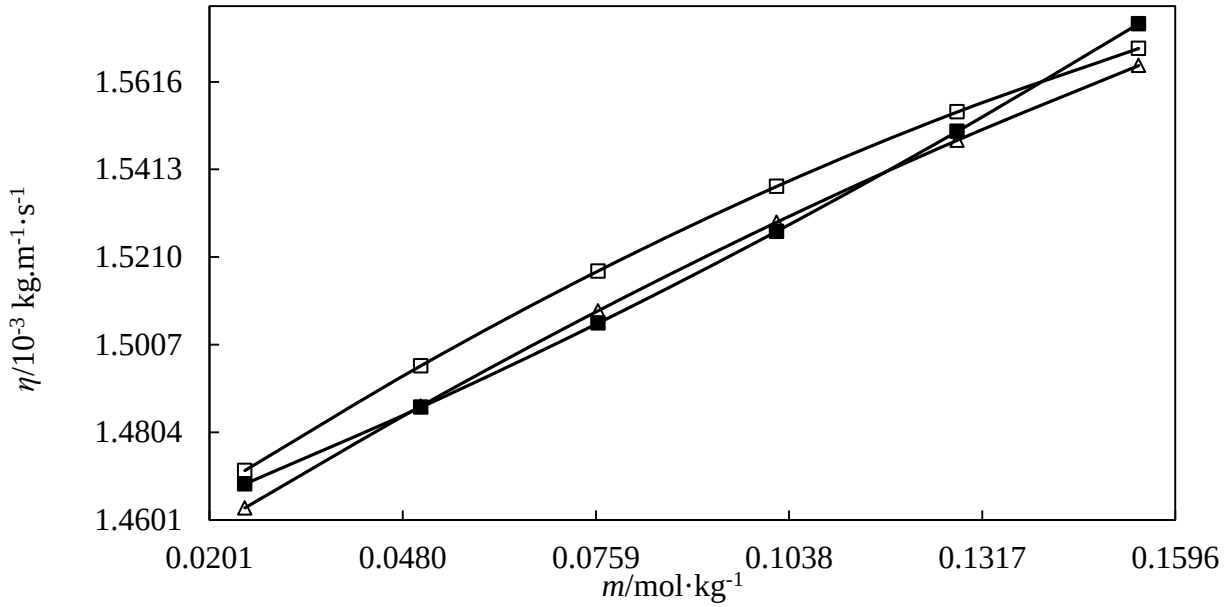

Figure S3. Effect of concentration on viscosity of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WCB at 298.15 K

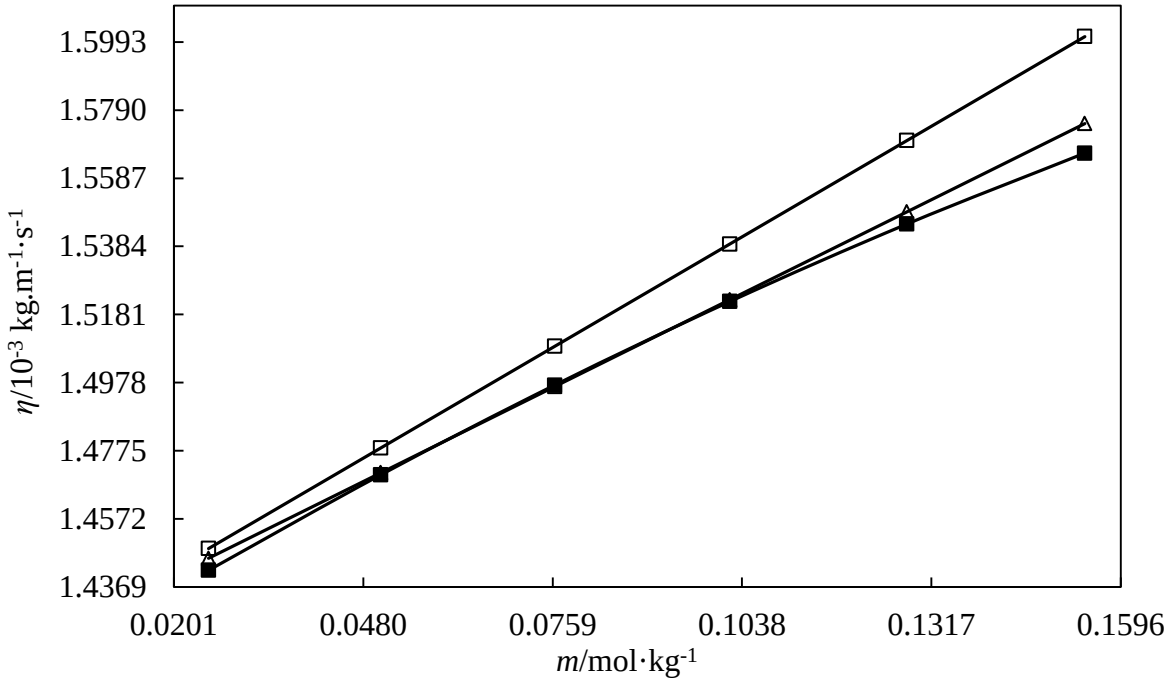

Figure S4. Effect of concentration on viscosity of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WCU at 298.15 K

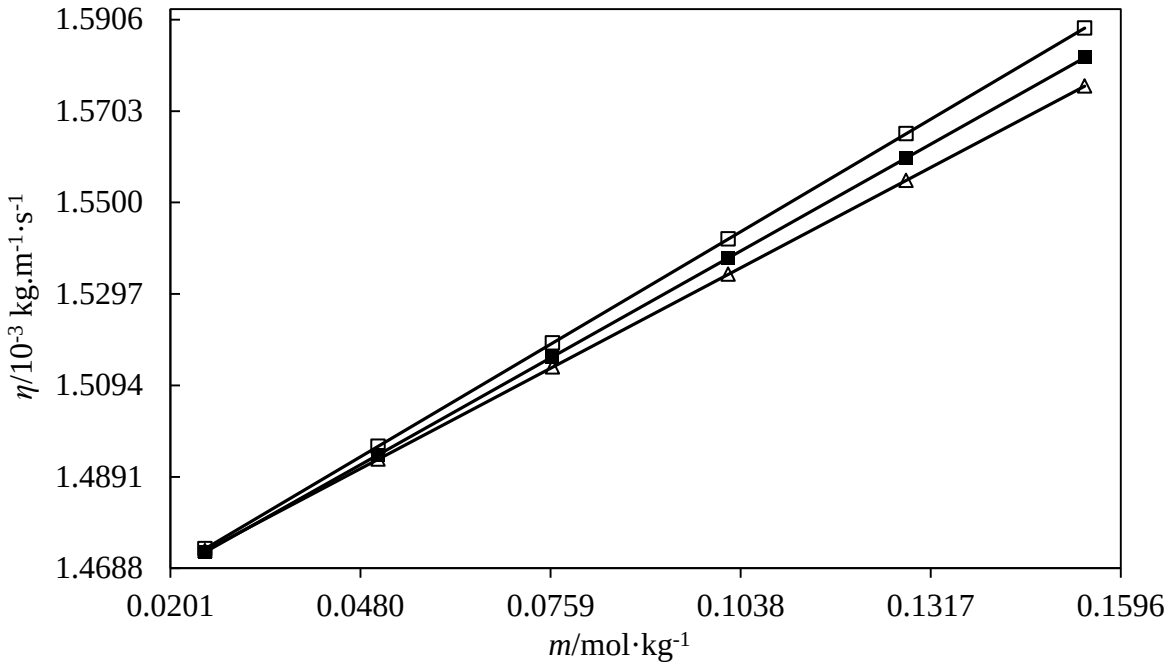

Figure S5. Effect of concentration on viscosity of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WCUB at 298.15 K

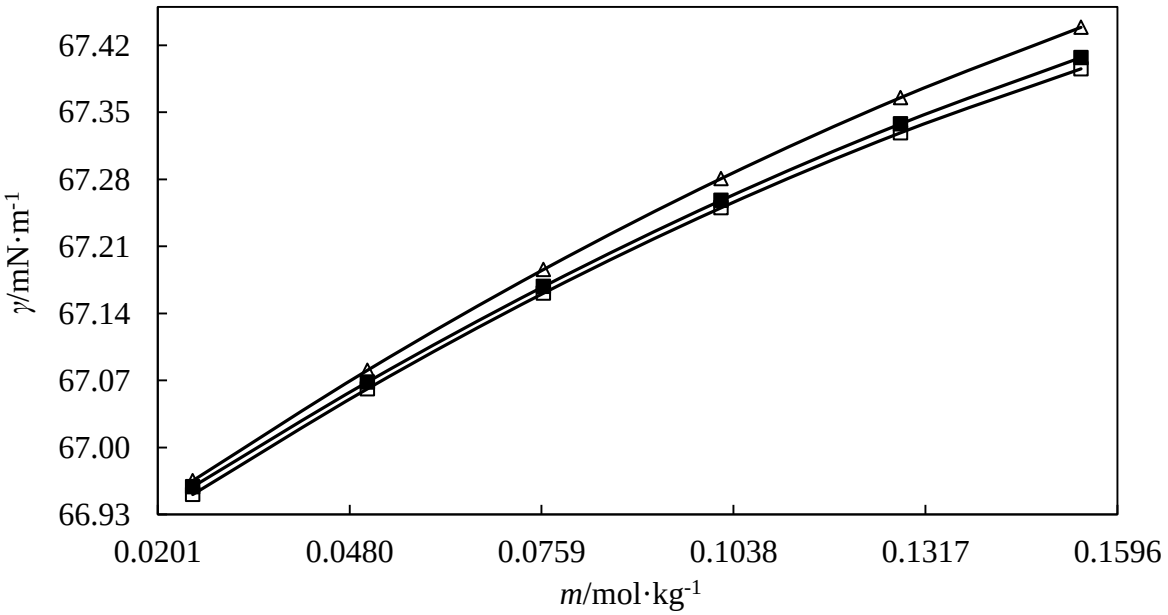

Figure S6. Effect of concentration on surface tension of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WC at 298.15 K

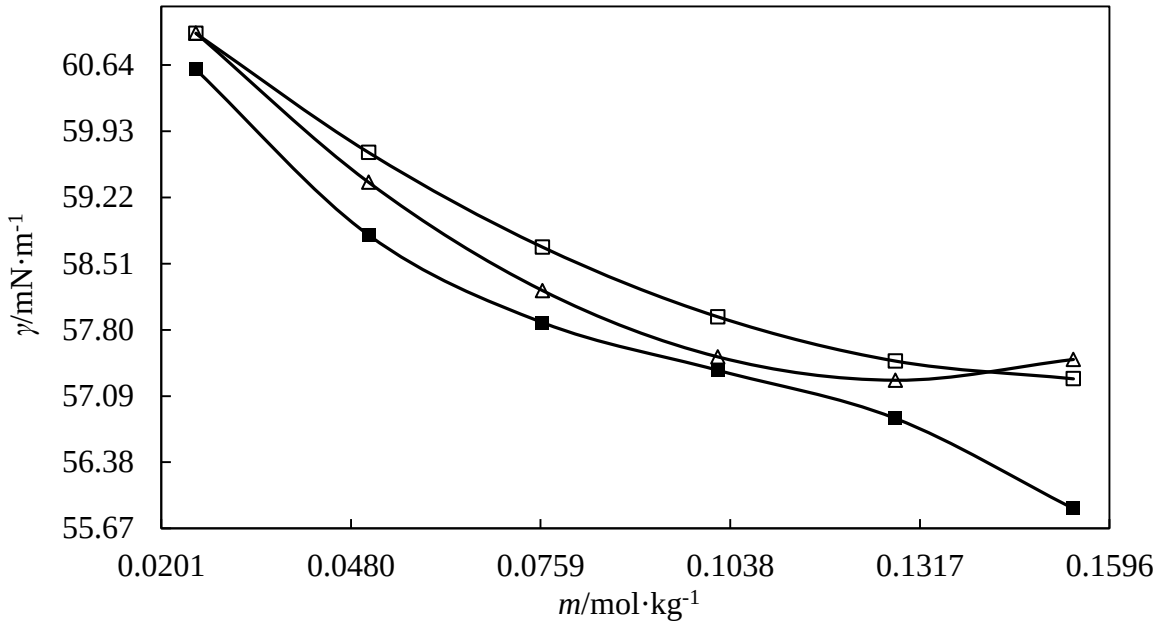

Figure S7. Effect of concentration on surface tension of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WCB at 298.15 K

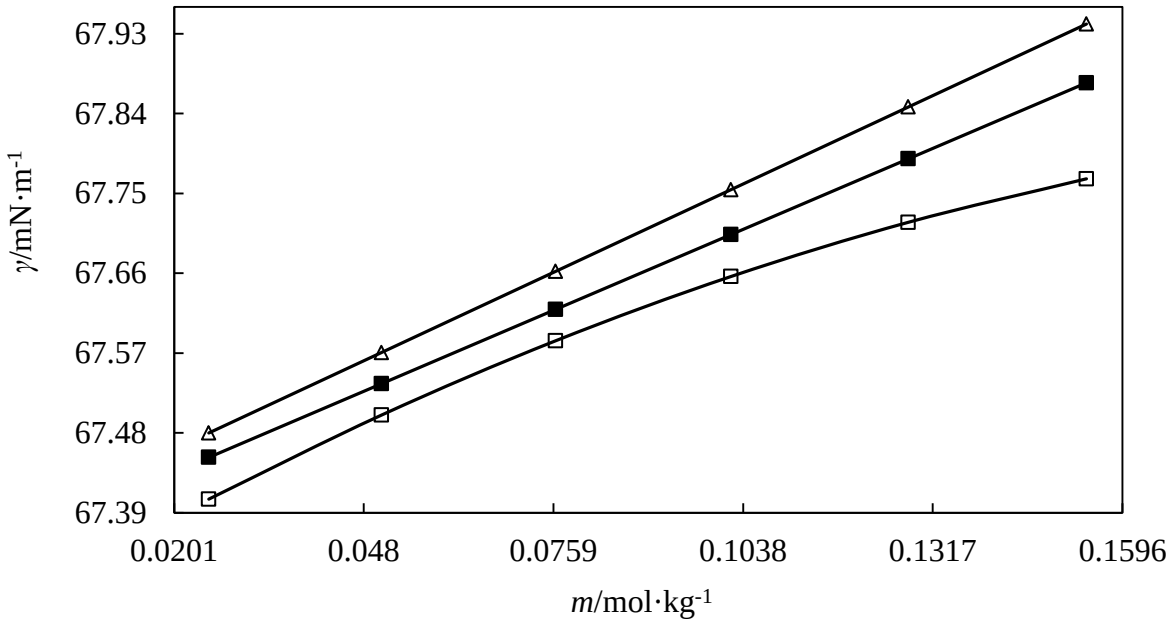

Figure S8. Effect of concentration on surface tension of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WCU at 298.15 K

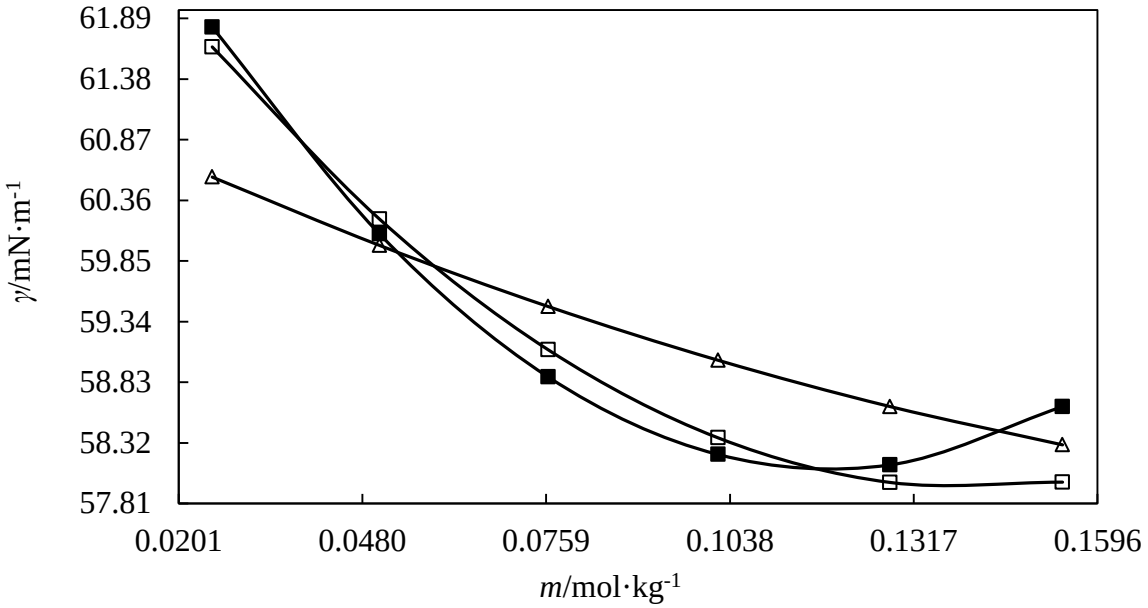

Figure S9. Effect of concentration on surface tension of $Pr(NO_3)_3$ (□), $Sm(NO_3)_3$ (■), and $Gd(NO_3)_3$ (Δ) with WCUB at 298.15 K

■ REFERENCES

(1) Riyazuddeen; Usmani, M. A. Density, speed of sound, and viscosities of (L-proline + aqueous glucose) and (L-proline + aqueous sucrose) solutions in the temperature range (298.15 to 323.15) K. *J. Chem. Eng. Data*. **2011,** *56*, 3504-3509.

(2) Markarian, S. M.; Terzyan, A. M. Surface tension and refractive index of dialkylsulfoxide + water mixtures at several temperatures. *J. Chem. Eng. Data*. **2007,** *52*, 1704-1709.