**The Effect of Total Molecular Valance Connectivity Indices**

**in Formation of Deep Eutectic Solvents**

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| **Abstract**  In this study, the relationship between the physical properties of the formed deep eutectic solvents and total valance connectivity indices of individual constituent molecules were investigated. While partial effect was found between the viscosity increase with increment of polar surface area of constituent molecules, direct relation for viscosity increase with total valance connectivity indices of constituent molecules forming deep eutectic solvents was discovered. The previously reported theory by L.B. Kier and L. H. Hall were proven a correlation between molecular connectivity indices and total valance connectivity [1, 2]. Constituent molecules were analyzed in terms of their total molecular valance connectivity indices prior to form deep eutectic solvents, and it was found that the decrease in total valance connectivity was strongly correlate with increase in viscosity of formed deep eutectic solvents. Viscosity measurements were carried at 30 oC, and choline chloride (total valance connectivity indice: 0.113) was chosen as main constituent molecule of prepared deep eutectic solvents. Other constituent molecules mixed with choline chloride were ethylene glycol (total valance connectivity indice: 0.1), urea (total valance connectivity indice: 0.06), malonic acid (total valance connectivity indice: 0.005), and citric acid (total valance connectivity indice: 8x10-5), and viscosity of the mixtures were measured as approximately 12 cP, 125 cP, 300 cP and >106 cP, respectively. The technique applied here can be useful for studies that viscosity crucially important, such as charge carrier systems, electrodeposition baths or extraction mediums before any attempt to prepare new deep eutectic solvents, and prevent the waste of time and resources. |
| Keywords: Total valance connectivity, Viscosity, Deep eutectic solvents. |

**References**

[1] L.B. Kier, L.H. Hall. (1986). Molecular connectivity in structure-activity analysis. *Research Studies*.

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