

Abstract Submitted
for the TSF12 Meeting of
The American Physical Society

An Innovative Technique of Liquid Purity Analysis and Its Application to Analysis of Water Concentration in Alcohol-Water Mixtures and Studies on Change of Activation Energies of the Mixtures DILIP DE, Kaduna State University, Kaduna State, Kaduna, Nigeria, ABDUL AZIZ DIKKO, FUTY, Yola, Adamawa State — The activation energy of a liquid molecule and hence its viscosity coefficient changes with addition of contaminants to the original liquid. This forms the basis of a new technology for analysis of purity of the liquid. We discovered that concentration of certain contaminants such as water in alcohol or vice versa can be uniquely and accurately determined in a short time (about 10-15 minutes) using a simple and yet innovative technique that only requires measurement of time of flow of the impure liquid (say, water-alcohol mixture) and distilled water through a simple viscometer designed and constructed for this purpose. We find that the viscosity coefficient μ of alcohol increased almost linearly with water concentration at a rate that depends on the type of alcohol and water concentration. We determined the increase of activation energy of alcohol molecules with increase of water concentration. This increase also depends on type of alcohol. Our detailed investigation on alcohol-water mixtures for both ethyl and methyl alcohol along with discussion on possible future potential application of such a simple, yet very reliable inexpensive technique for liquid purity analysis is presented. A comparison is made of our present method with other methods on the accuracies, problems and reliability of impurity analysis in liquids. A part of the quantum theory of viscosity of liquid mixtures that is in the developmental stage in order to explain some of the observed properties is presented.

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Date submitted: 10 Sep 2012

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