Influence of Nanomaterials on Changes in Density of Aqueous Ethyleneglycol Solutions

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The density of complex mixtures such as aqueous solutions of ethyleneglycol and nanomaterials is valuable information for the characterization of ethyleneglycol reserves. The main problem is the scarcity of these data since the experimental determination of density of complex mixtures is very time consuming. This work presents a method to determine the density of complex system composed of a mixture of (water+ethyleneglycol+nanomaterials). Density is one of the most important physical properties and its measurement is important to almost all processes. Its knowledge in different temperature and pressure conditions is not only necessary in many industrial applications, but it is also essential for calculating properties such as solubility or viscosity. Among them, it highlights the vibrating tube densimetry as a precise and relatively rapid technique, being based on the measurement of the resonance frequency of a tube filled with fluid excited electronically. On the other hand, generally the manual procedure to determine PVT data in a broad range of PT conditions is tedious and time – consuming. Automated measuring systems permit one to modify and control the experimental conditions as well as to perform the data acquisition without the intervention of the experimentalist, reducing therefore the effect and the time involved in the determination of density, and reducing measurement uncertainties. The results of experimental research on the density of ethyleneglycol+water+ nanomaterials the temperature range 293.1-473.5 K, and pressure range 0.101-49.1 MPa, with concentration 0.1-0.9 mass fraction H_2O are presented. A generalized aqueous solution has been developed. The common relative errors of measurement in density with a coefficient of confidence, α, of 0.95 are 0.1 %.