# A New Simple Equation For Viscosity of Pure Fluids

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## Abstract:

The viscosity of pure fluids were modelled by a new equation derived on the basis of statistical thermodynamic interpretation of Eyring's absolute reaction rate theory and the molar activation energy of 111 pure fluids were calculated.

The molar activation energies were temperature dependent. Therefore, a simple two-parameter equation was used to correlate the results and the parameters were calculated for each pure fluids. The results of viscosity calculations were compared with other models. The lower absolute average deviations indicated the superiority of the new model.

**Keywords:** viscosity, activation energy, Eyring's absolute reaction rate theory.

## Introduction:

Knowledge of viscosity of pure liquids and respective mixtures is important for practical and theoretical purposes [1-3]. The viscosity of multicomponent liquid mixtures is an invaluable type of data for chemical engineer in design and optimization of industrial process. Furthermore, the simultaneous investigation of viscosity and volume effects on mixing can be a powerful tool for the characterization of the intermolecular interactions present in these mixtures.

Compilations of the viscosities of pure liquids at the different temperatures and pressures, as well as, those of binary liquid mixtures through the whole composition range, can be found in the literature [4-8]. Nevertheless, the situation changes in the case of multicomponent liquid mixtures.

Over the last years, numerous equations for liquid mixture viscosity have been proposed for implementation in computer prediction routines. The results, in general, are in poor agreement with experimental values, unless pure component and binary solution viscosity data are taken into account. A recent review, concerning viscosity modeling may be found in the work of Reid et al.[9].

Most of the methods available in the literature for liquid mixture viscosity calculations is based on the principle of corresponding state,[10-12] the absolute rate theory of Eyring and co-