

Dielectric Properties of Liquid Refrigerants: Facts and Trends

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It is today widely accepted that chlorine-containing compounds (CFCs and HCFCs) are the source of ozone depletion in Earth's atmosphere and contribute to the greenhouse effect. Replacement of these compounds by alternative refrigerants, chlorine free, usually named hydrofluorocarbons (HFC's), is now fully established, needing values of the thermophysical properties of these compounds, chosen with regard to their values of the ozone depletion potential (ODP) and global warming potential (GWP). In spite of the tremendous effort developed to determine new property data, establish equations of state and correlation/predictive schemes, there are still some fields that can still be object of research, in order to contribute to a sustainable area of knowledge. In this paper we will analyse the situation of the dielectric properties of the refrigerants, both on the liquid and gaseous states, from the experimental and theoretical point of view, based on more than one decade of research of our group. Examples of predictive power of simple models, will illustrate the existing tools for electrical permittivity and dipole moment prediction/correlation. The relation of Baron and Buep between the electrical permittivity and viscosity was analysed and extended to the pressure variation. Analogies between the Vedam equation and the rough hard-sphere theory of transport properties were encountered and will be the object of future analysis.