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# FREE VOLUME THEORY IN PHYSICAL AND RHEOLOGICAL EQUATION OF STATE

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The free volume theory is a common basis of the physical and rheological equations of state. Pressure and temperature dependecies of shear and elongation viscosity were investigated for propylene homo- and propylene-1-pentene, -1-hexene and -nonene copolymers and ethylene homopolymer and ethylene-1-butene, 1-pentene and 1-hexene copolymers. The short branching degree depenedence of thermal sensitivity and pressure coefficient were determined. The fractional free volume was calculated from the viscosity curves and the thermal expansion coefficient and compressibility factor of fractional free volume were determined. The temperature, pressure and stress dependence of fractional free volume was investigated. The measured PVT data were also used to determine the pressure and temperature dependence of fractional free volume. The fractional free volume calculated from viscosity data were compared from values come from PVT measurement. A conversion equation was suggested. The thermal expansivity and compressibility were determined and the effects of short branching degree were investigated.