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Chain Length Dependence of the Thermodynamic Properties of Linear and Cyclic Alkanes and Polymers SINDEE SIMON, DINGHAI HUANG, GREGORY MCKENNA, Texas Tech University — The specific heat capacity was measured with step-scan DSC for linear alkanes from pentane to nonadecane, for several cyclic alkanes, for linear and cyclic polyethylenes, and for a linear and a cyclic polystyrene. For the linear alkanes, the specific heat capacity in the equilibrium liquid state decreases as chain length increases; above a carbon number N of 10 (decane) the specific heat asymptotes to a constant value. For the cyclic alkanes, the heat capacity in the equilibrium liquid state is lower than that of the corresponding linear chains and increases with increasing chain length. At high enough molecular weights, the heat capacities of cyclic and linear molecules are expected to be equal, and this is found to be the case for the polyethylenes and polystyrenes studied. The thermal expansion coefficients and the specific volumes of the linear and cyclic alkanes are also calculated from literature data and compared with the trends in the specific heats.

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