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New lubrication concepts for environmental friendly machines

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The use of alternative oils for the lubrication of automobile engines has a potential of ecological and technical advantages. It requires the detailed knowledge of several thermophysical and viscometric properties in a large temperature range (mapping). Therefore, the following properties of up to twenty-eight different oils have been measured in the temperature range from 22 °C to 150 °C: density, heat capacity, thermal conductivity, viscosity at ambient pressure, viscosity under shear rates above 10^6 s^{-1} , and the viscosity at elevated pressures (maximum 100 MPa). The last two have been measured with a substantially improved and a newly developed apparatus, respectively. The pressure-viscosity coefficient has been measured on four hydrocarbon-based, factory-fill oils, a paraffin oil and twenty-three alternative oils. Nine of the alternative oils are based partly or completely on esters, the other fourteen on polyglycols, two of them additionally on water.