

Azeotropes

Behavior & Application

**...just the color figures for those who got the B&W
printed book...**

by D. James Benton

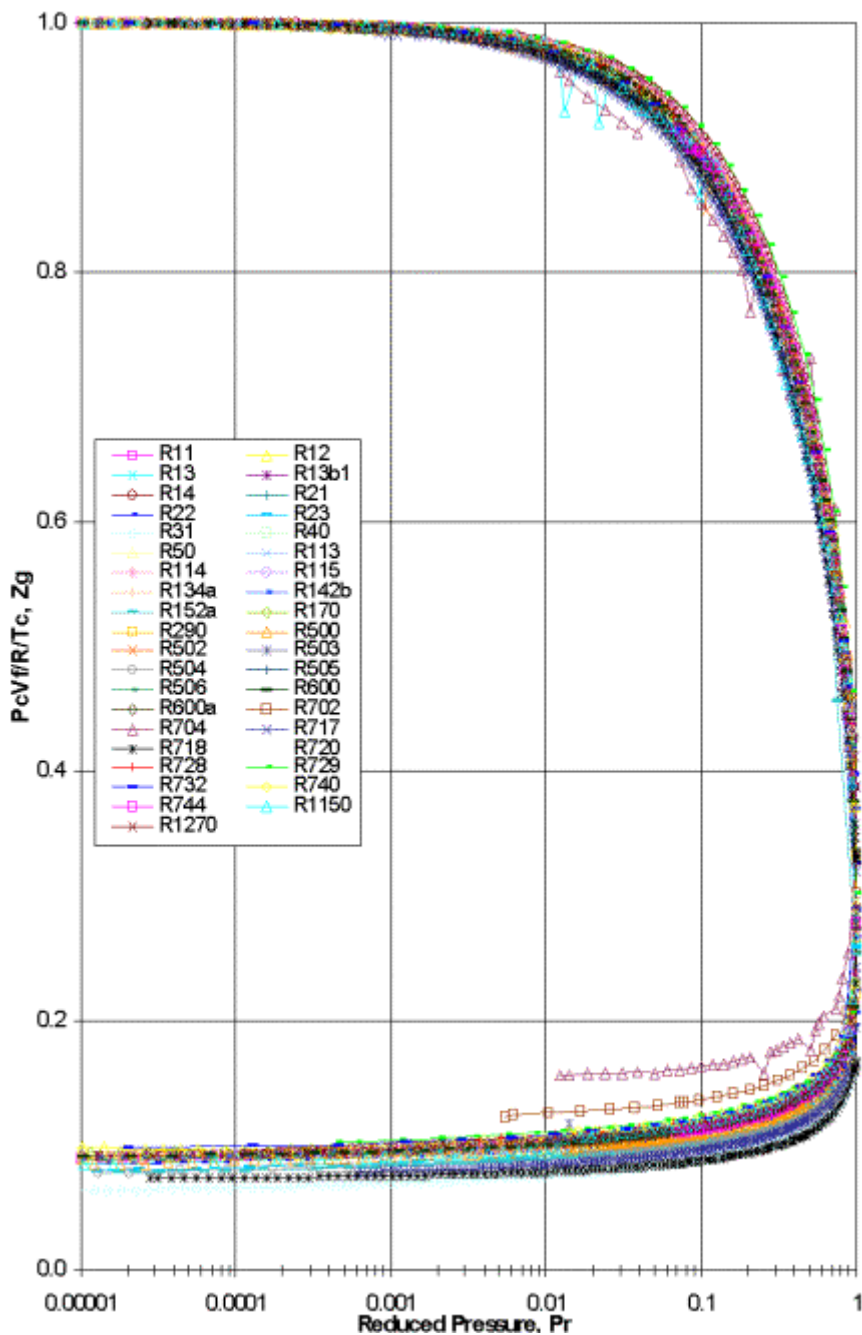
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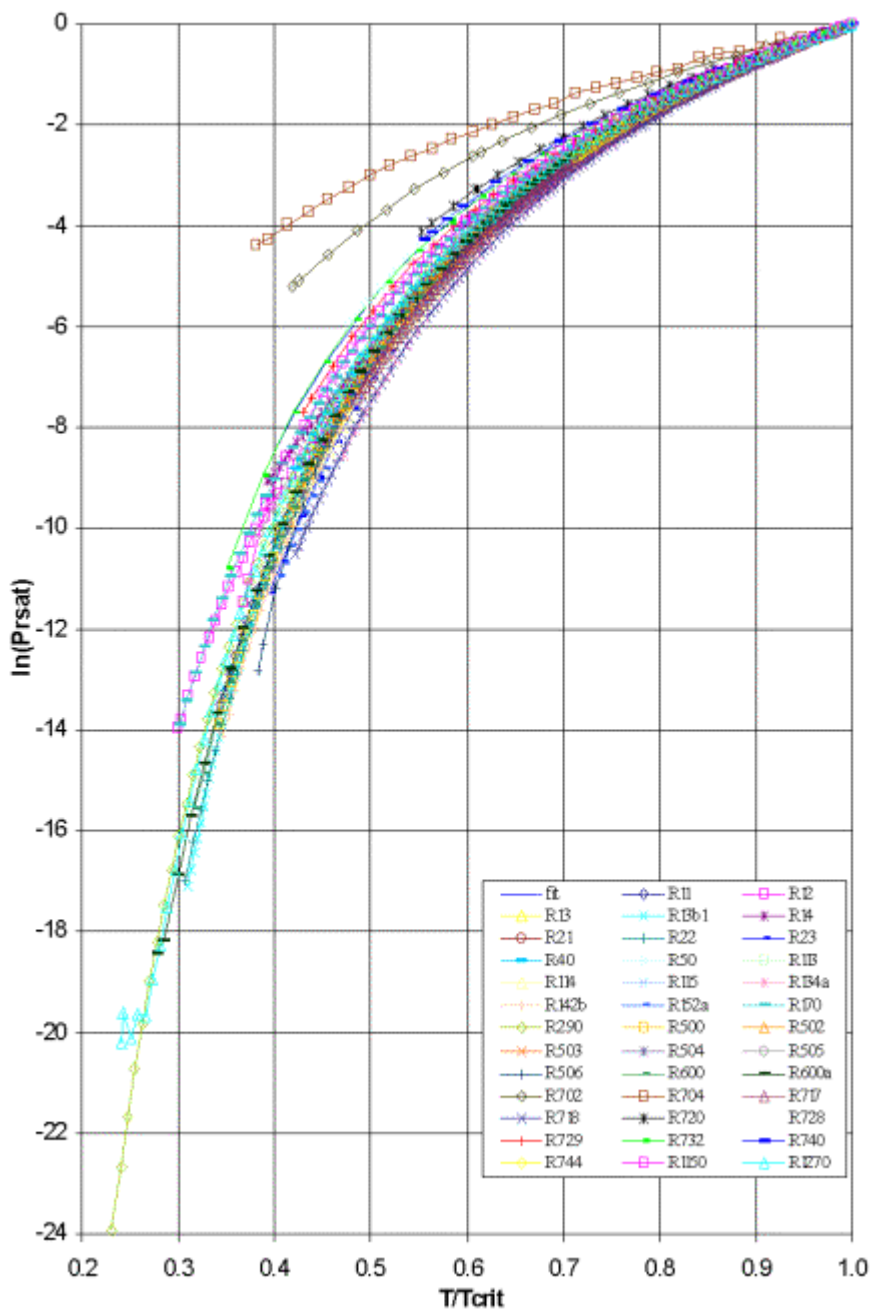
Forward

Azeotrope refers to a mixture of two or more fluids whose proportions cannot be altered by simple distillation. Azeotropes exhibit the same mass fraction of constituents in the vapor and liquid phases; thus, when boiled, the vapor has the same composition as the liquid. This behavior differs from ideal solutions, where one component is typically more volatile than the others. The azeotrope may have a higher or lower boiling point than the constituents. We study these anomalous fluids because they may exhibit properties that are more advantageous than the constituents. A similar motivation accompanies multi-weight lubricants. In this text we will explore thermodynamic and transport properties as well as applications, including: refrigeration and vapor power cycles.

*All of the examples contained in this book,
(as well as a lot of free programs) are available at...*

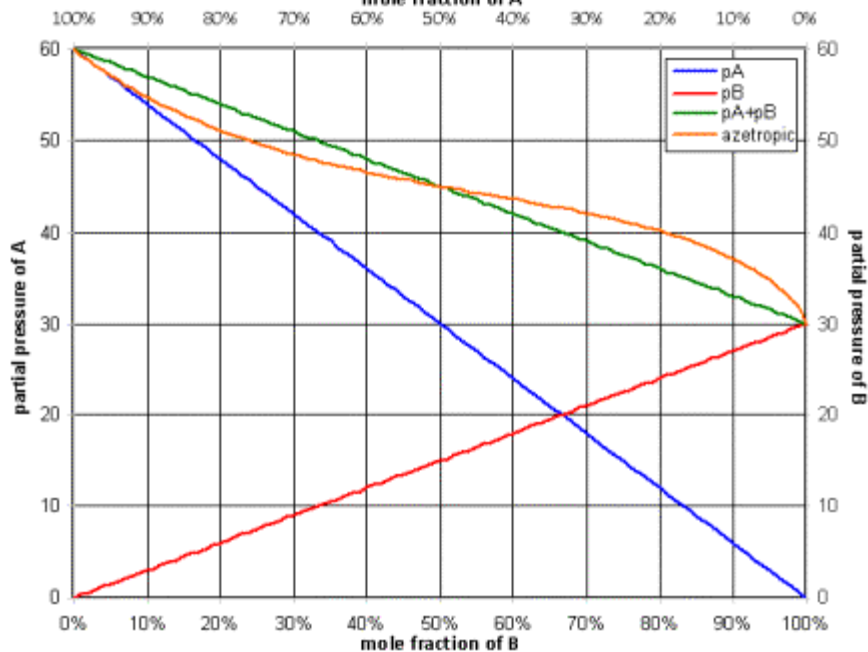
<http://www.dudleybenton.altervista.org/software/index.html>

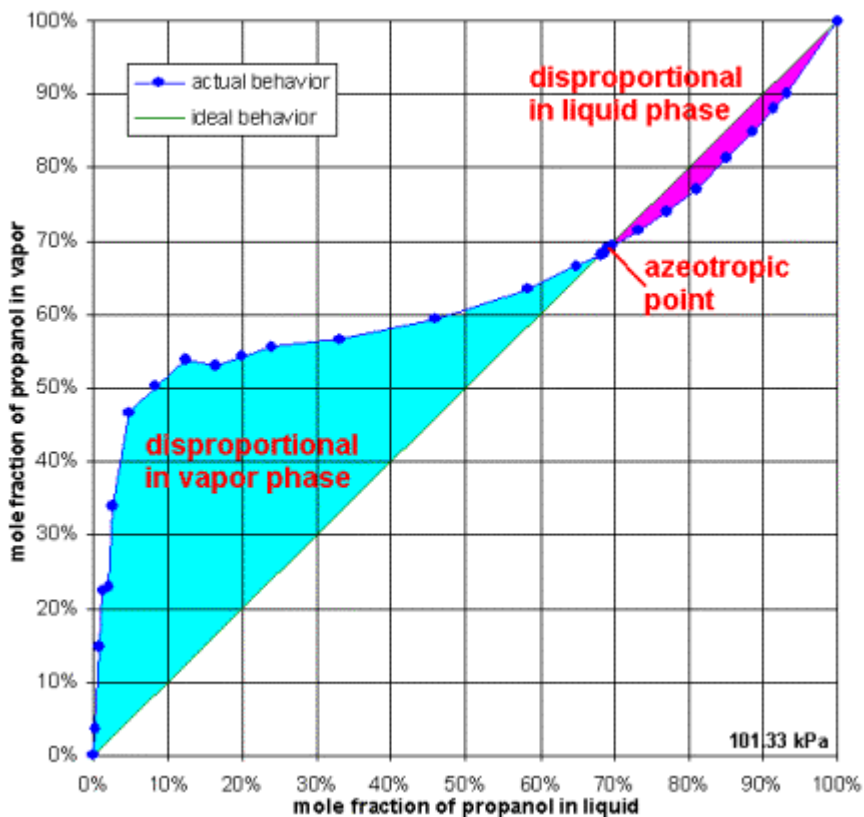




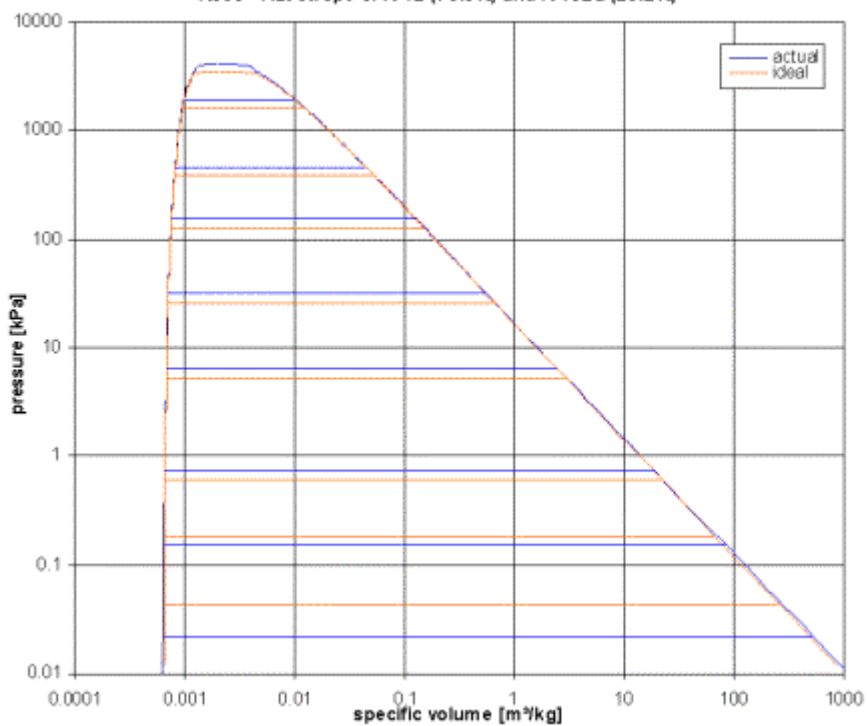
Raoult's Law

mole fraction of A

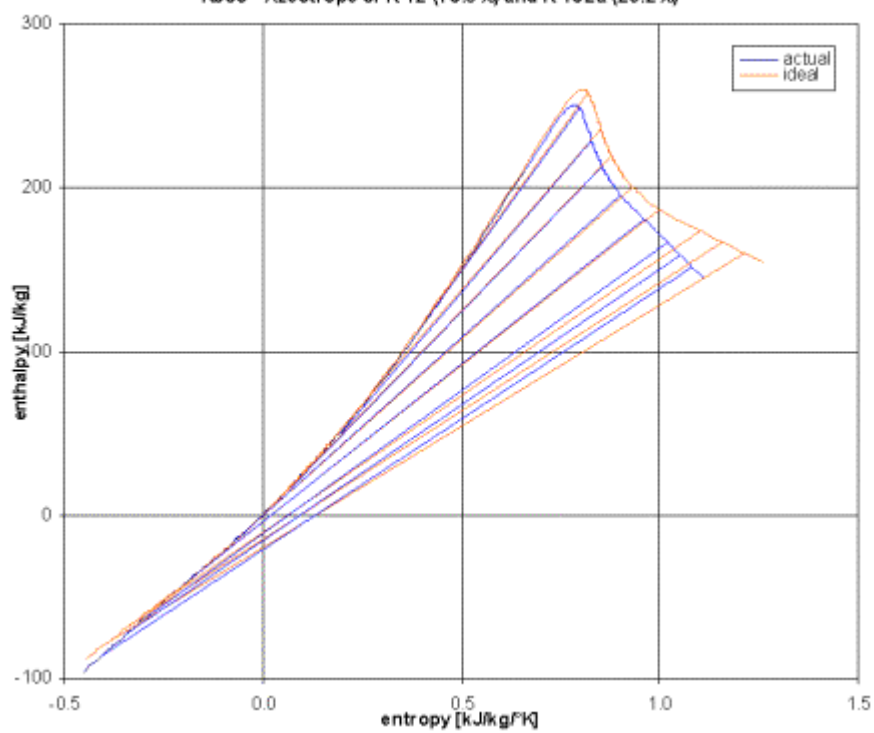


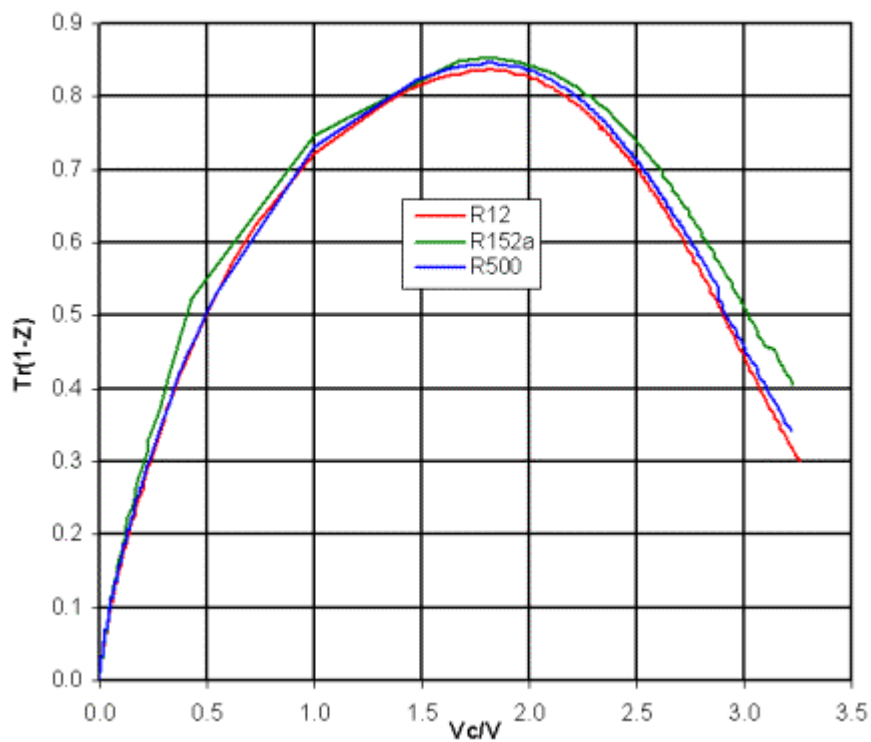


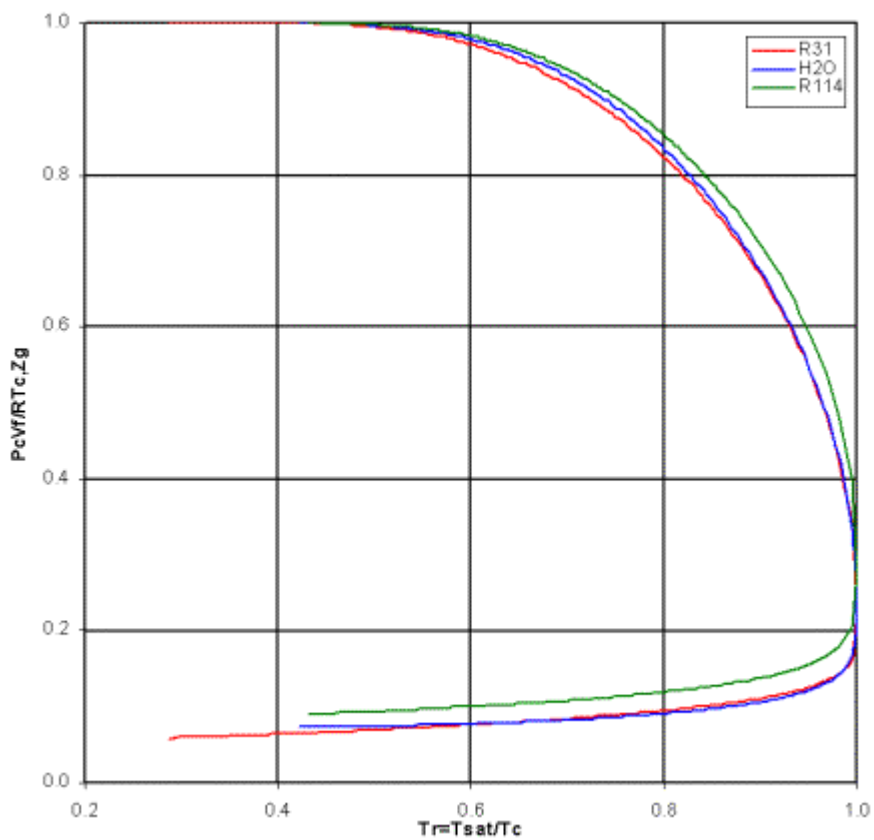
R500 - Azeotrope of R-12 (73.8%) and R-152a (26.2%)



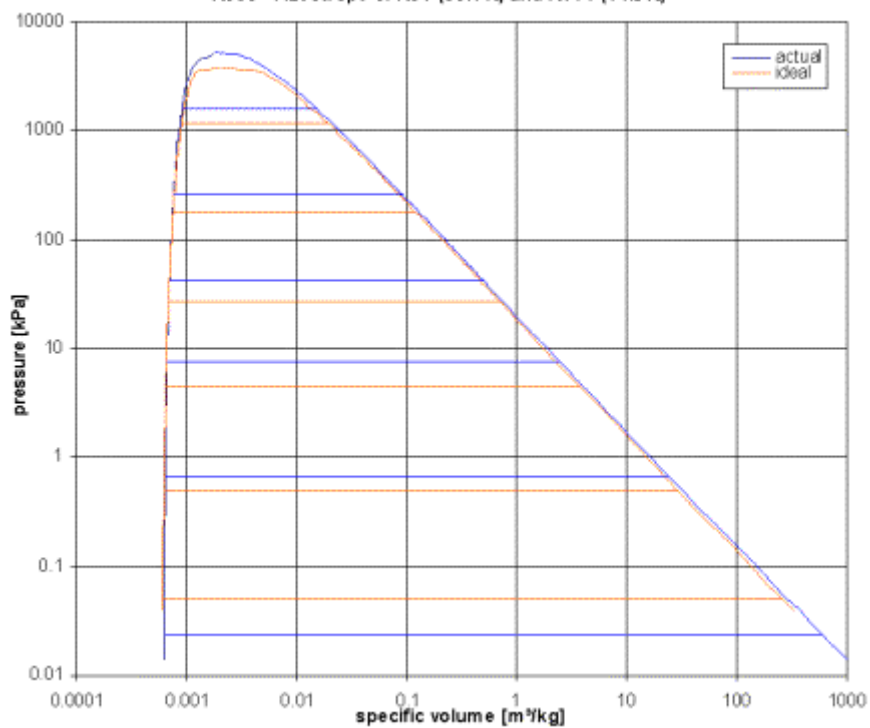
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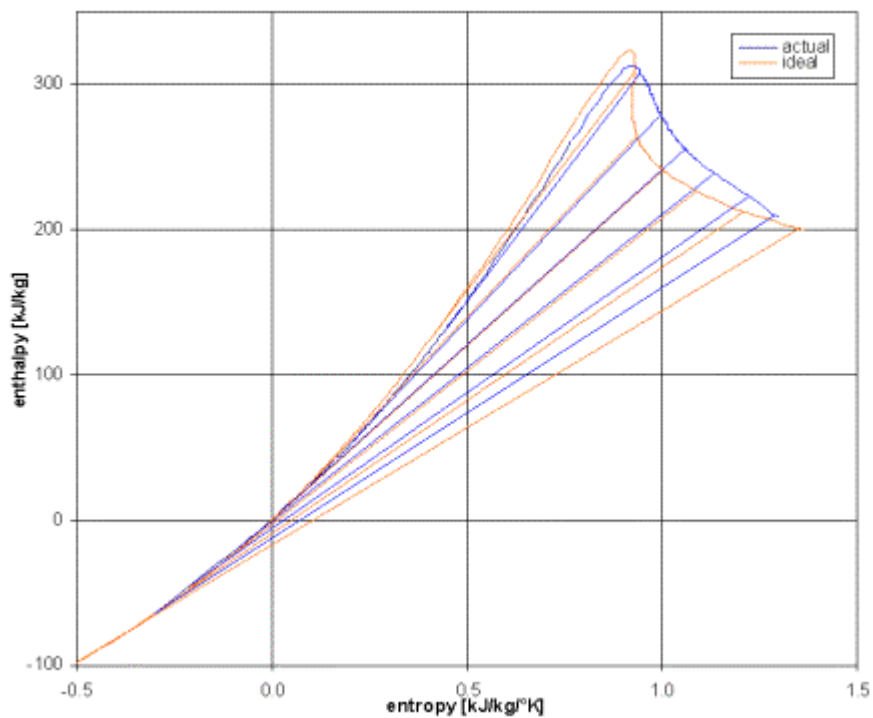




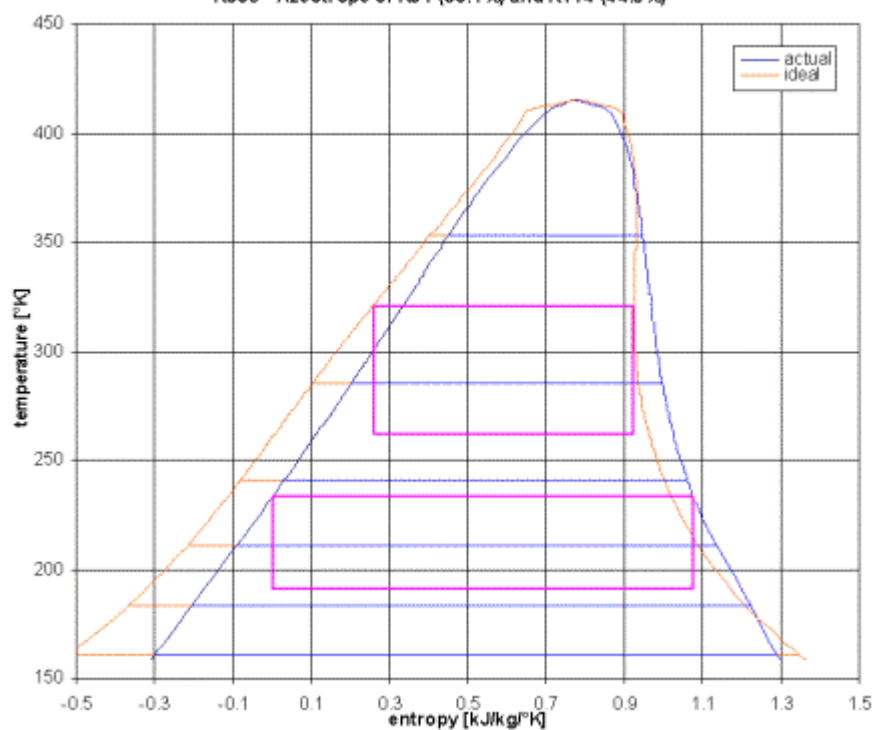
R506 - Azeotrope of R31 (55.1%) and R114 (44.9%)



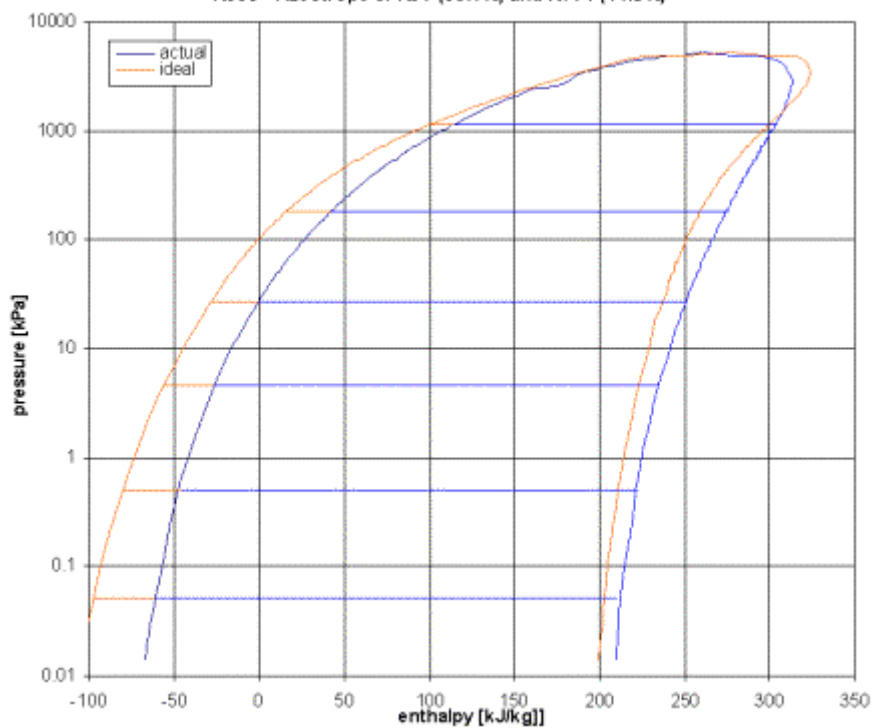
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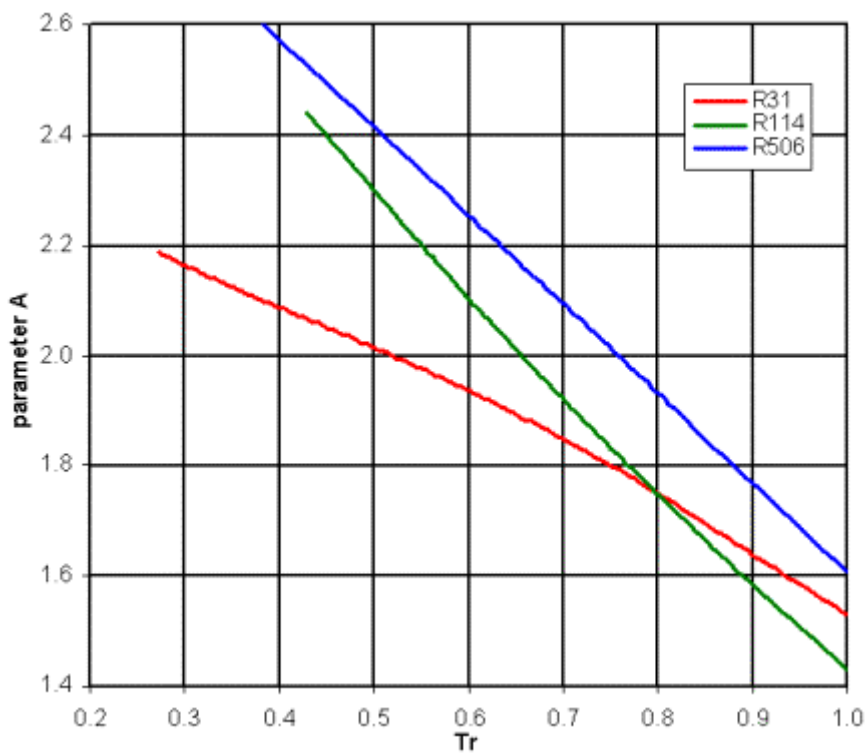


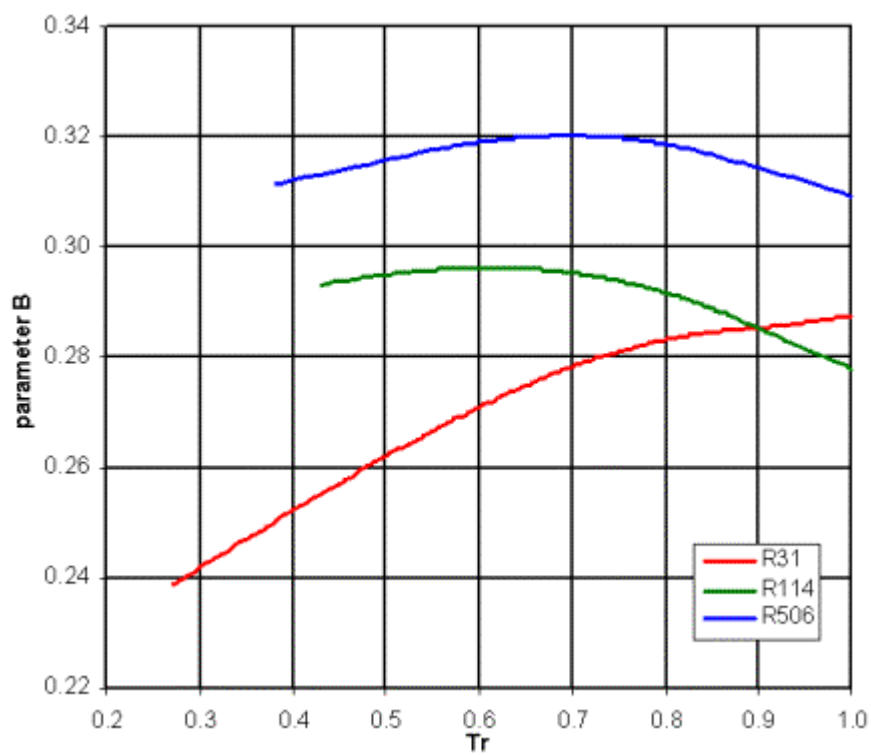
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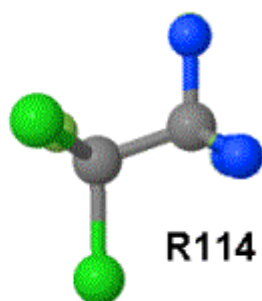
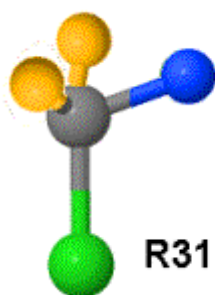
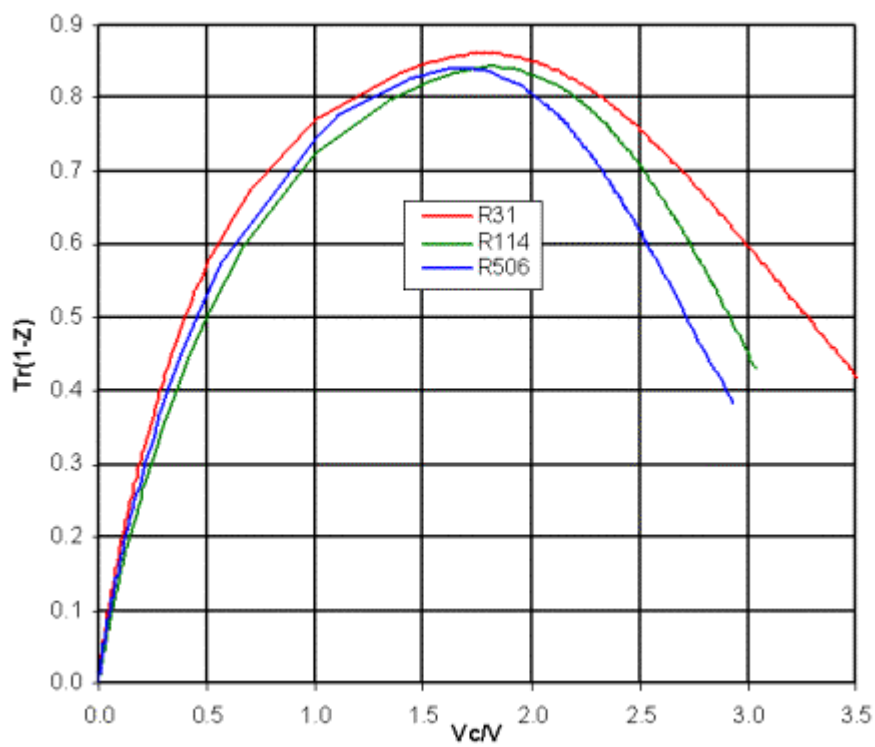


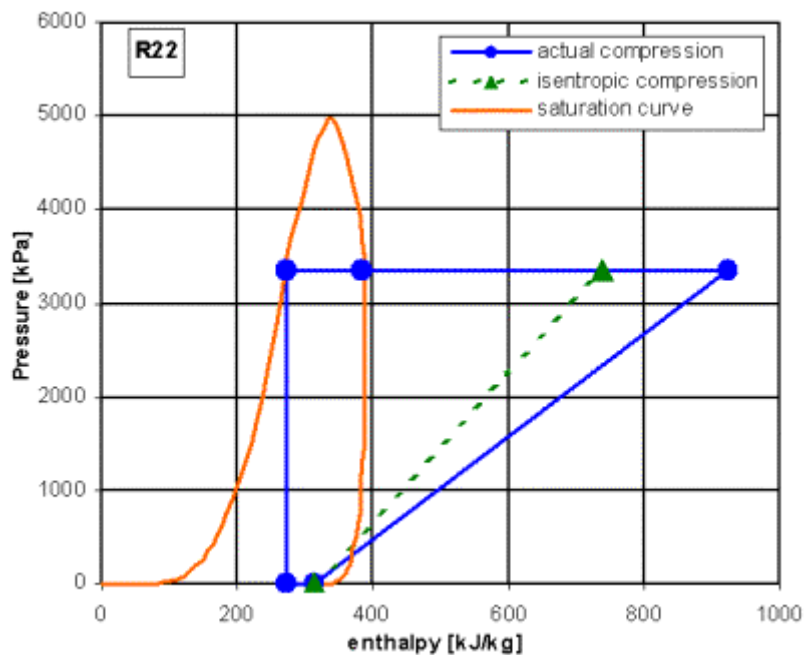
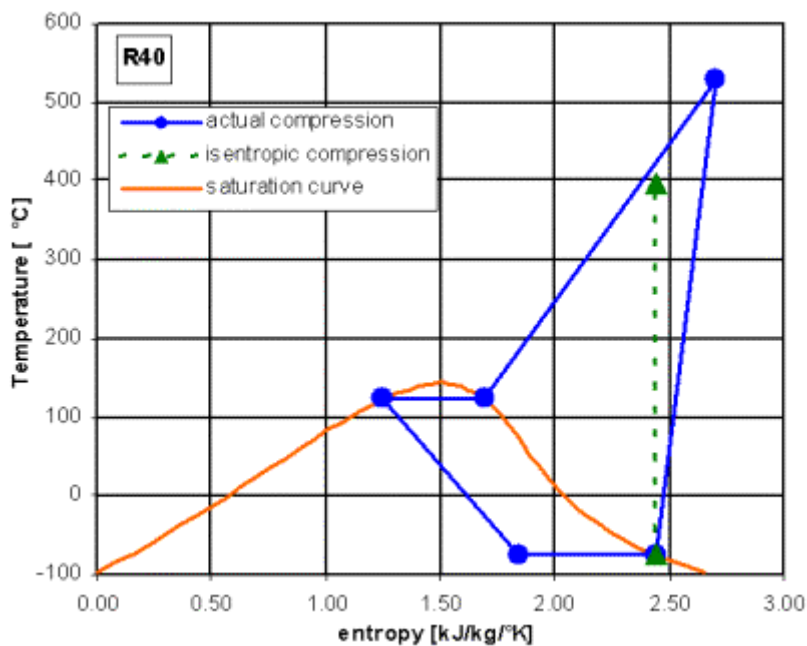
R606 - Azeotrope of R31 (55.1%) and R114 (44.9%)



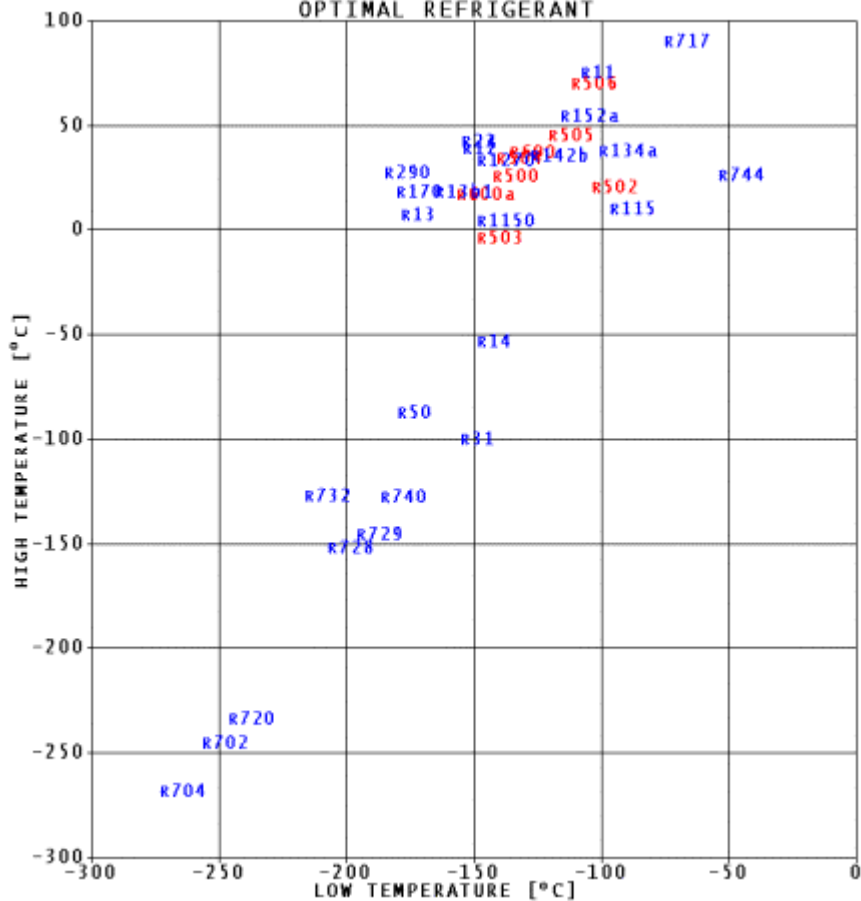




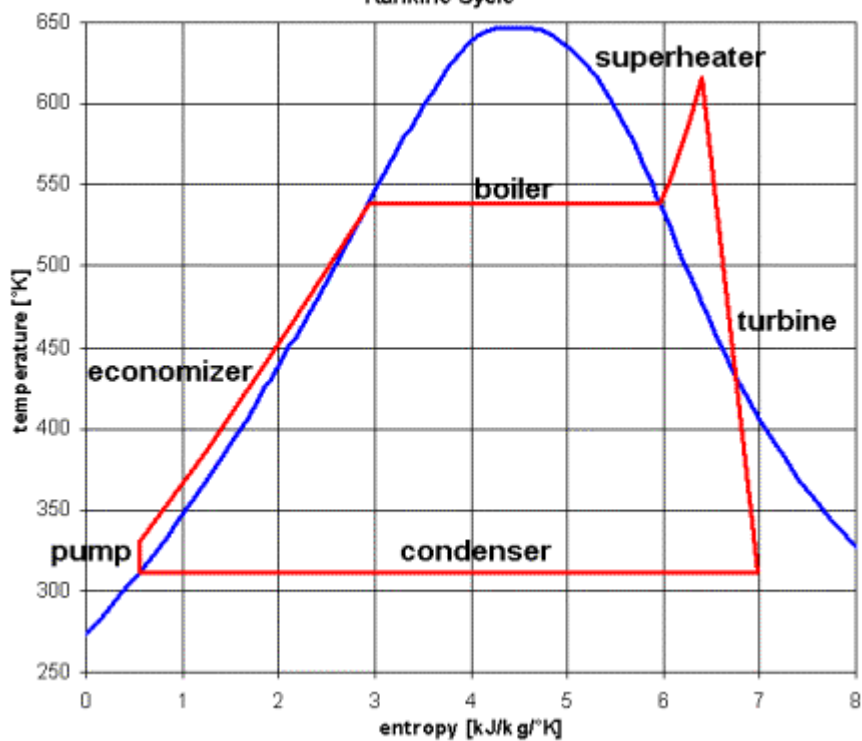


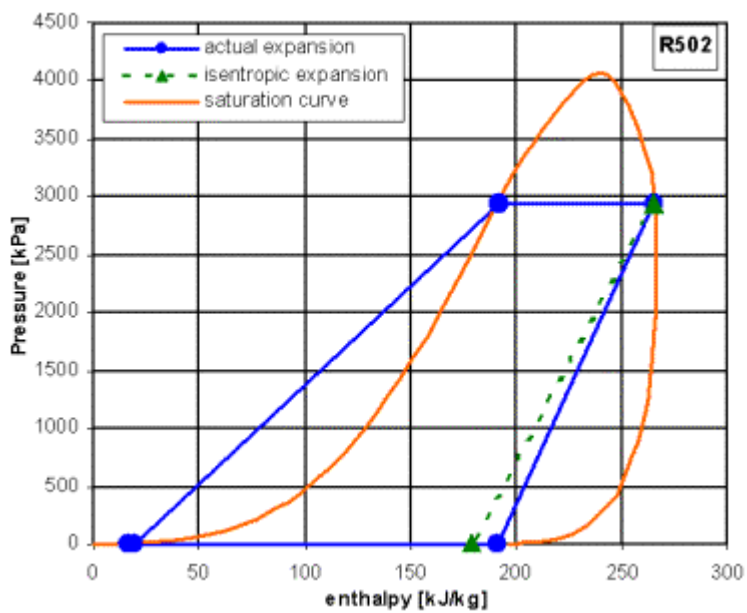
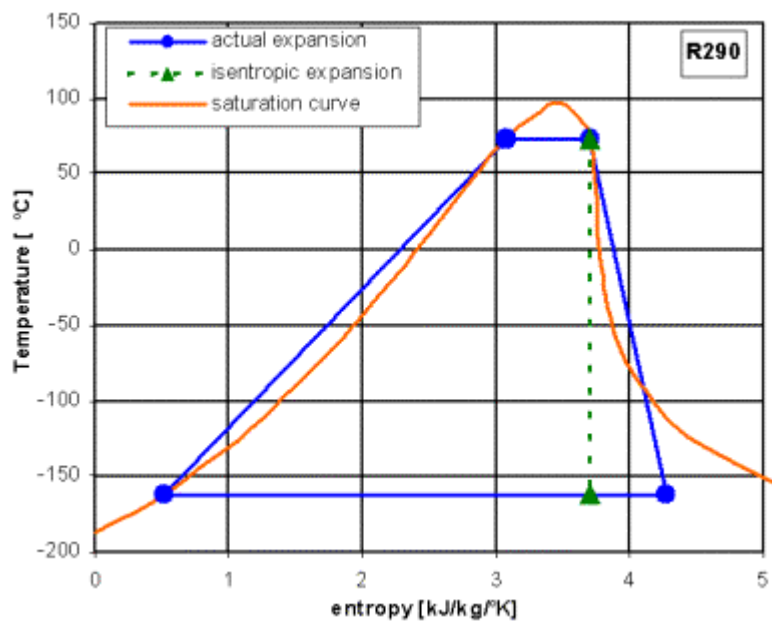


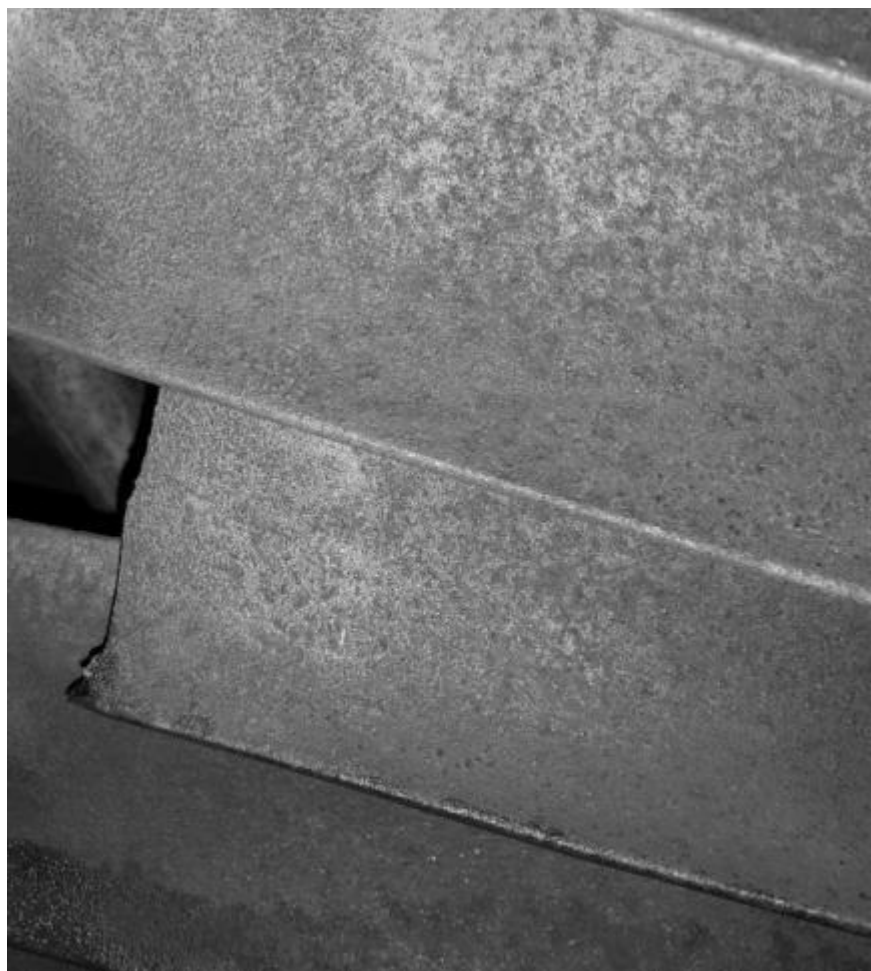
OPTIMAL REFRIGERANT



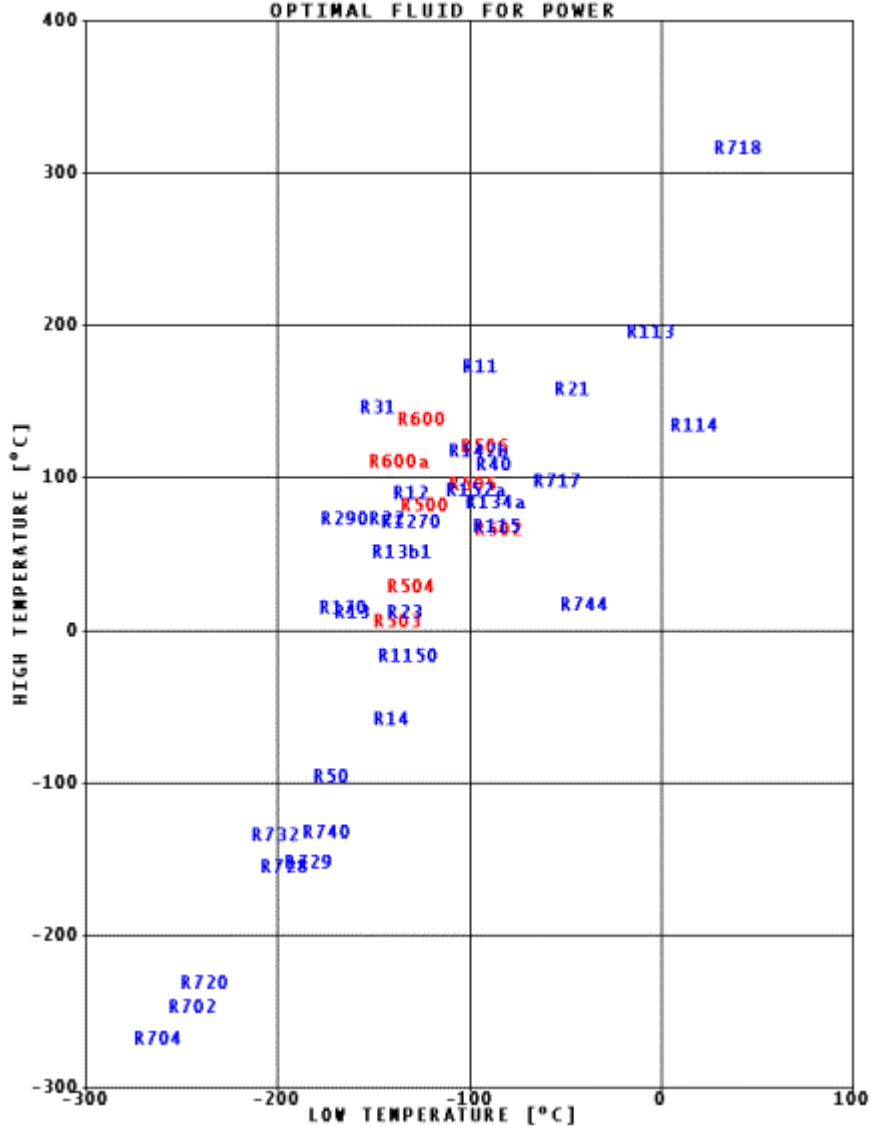
Rankine Cycle



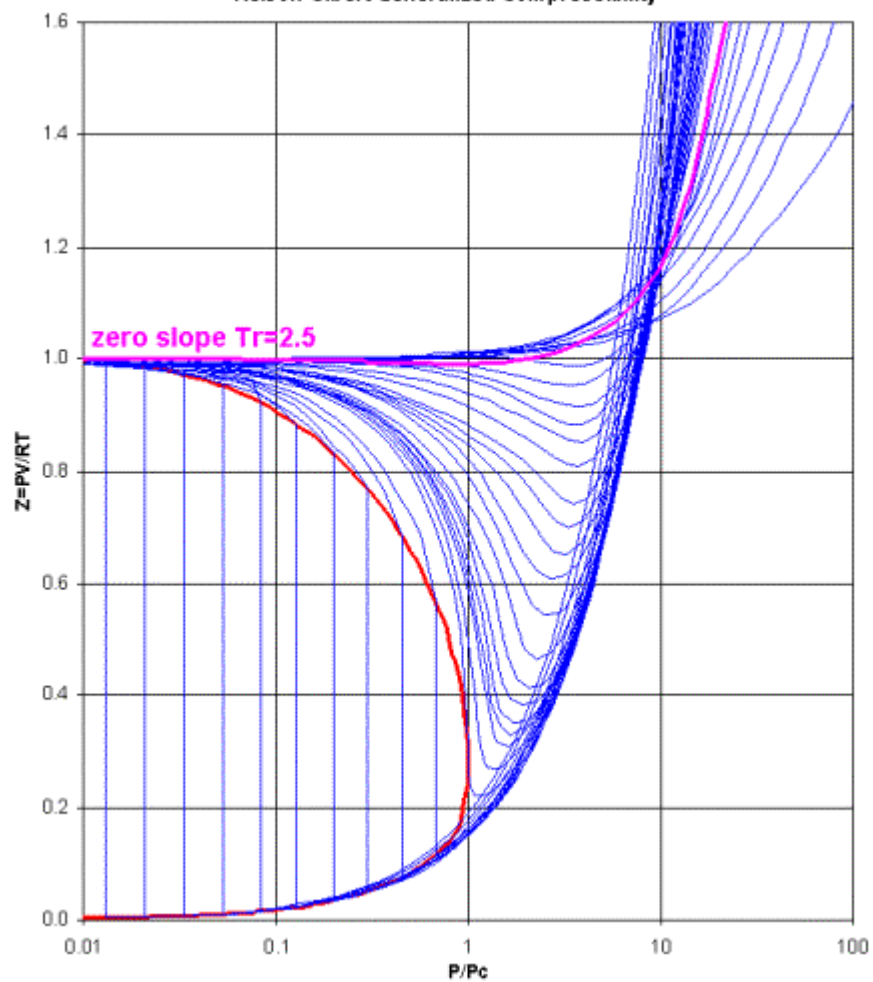


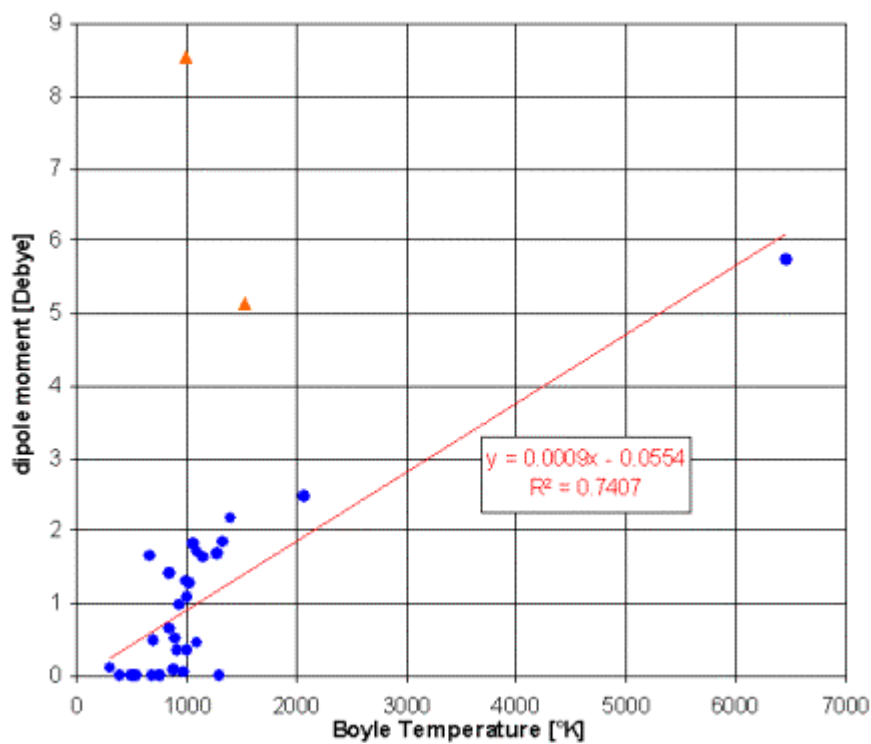


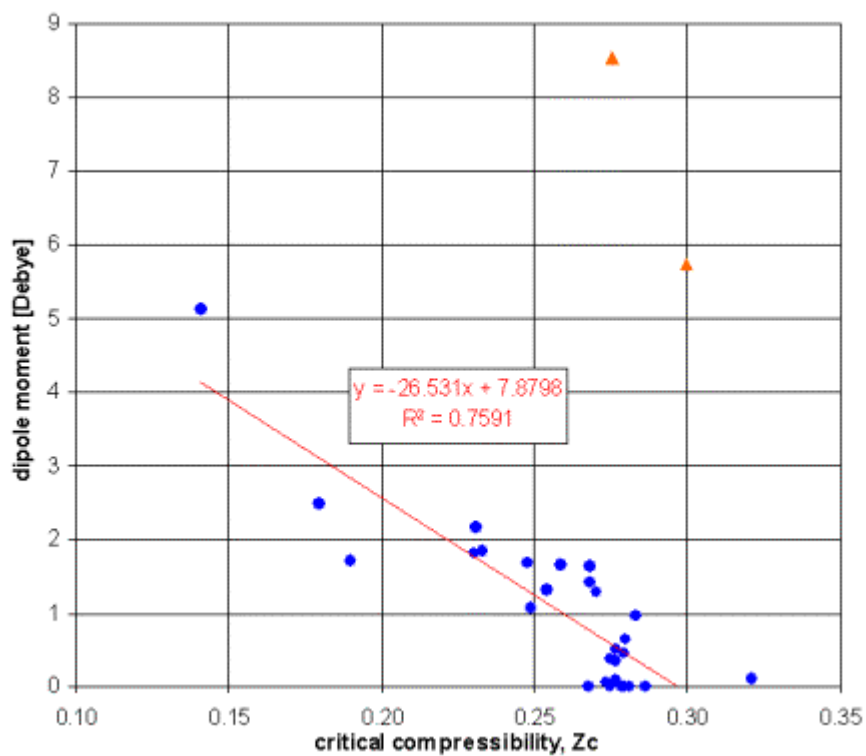
OPTIMAL FLUID FOR POWER

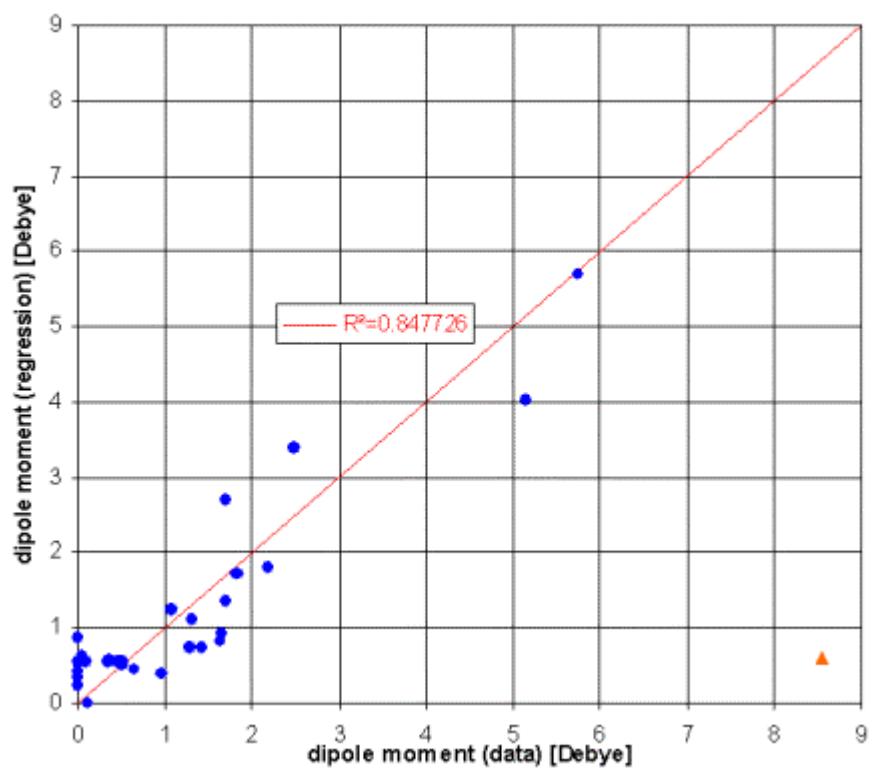


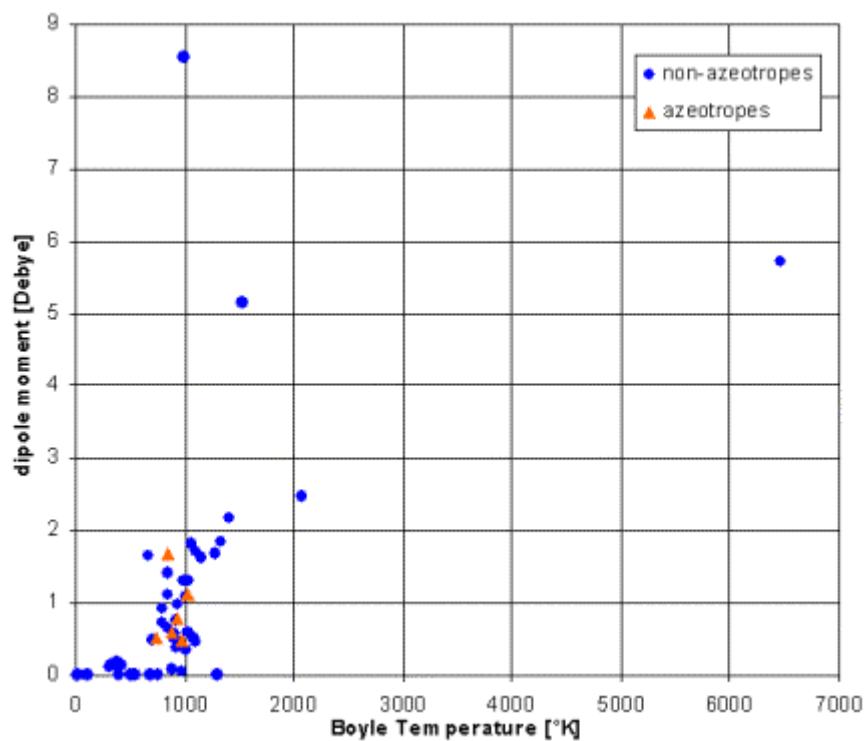
Nelson-Olbert Generalized Compressibility

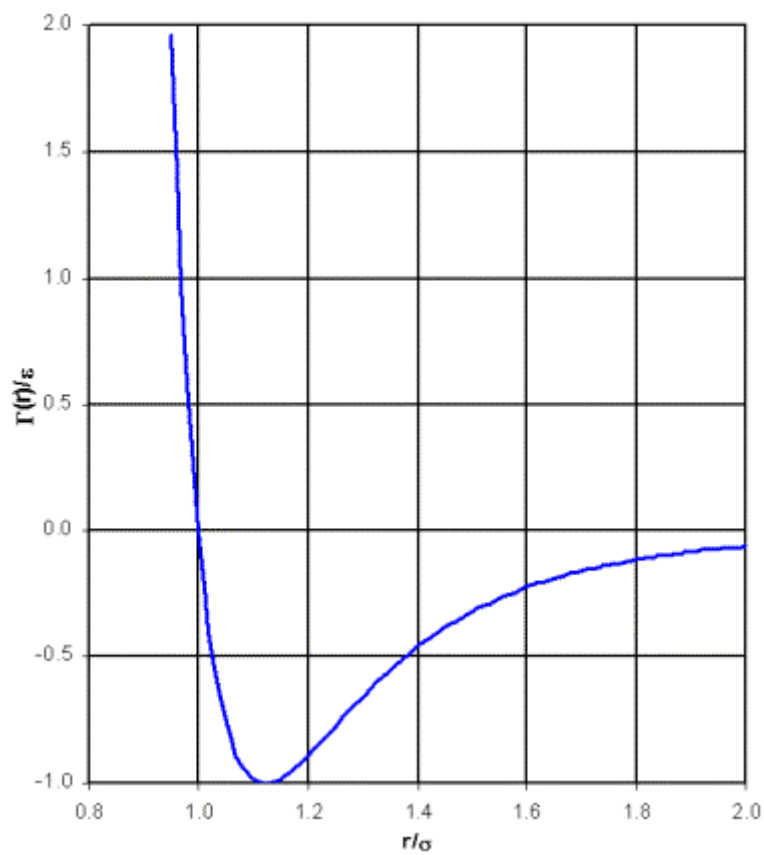


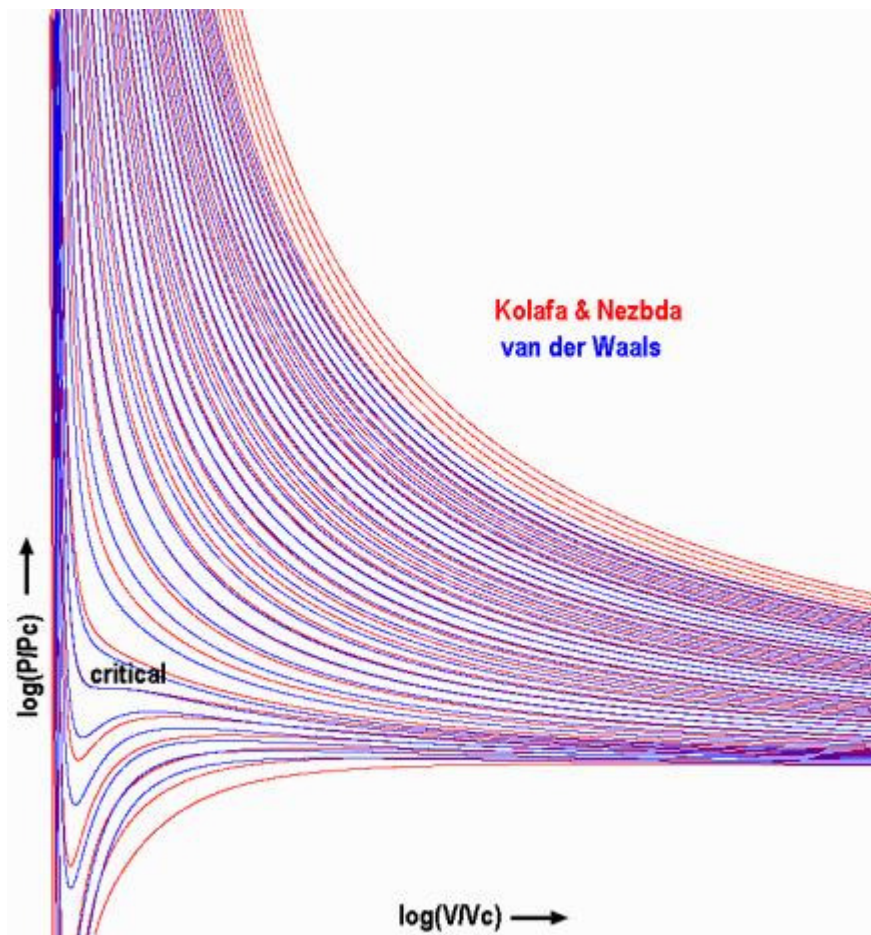


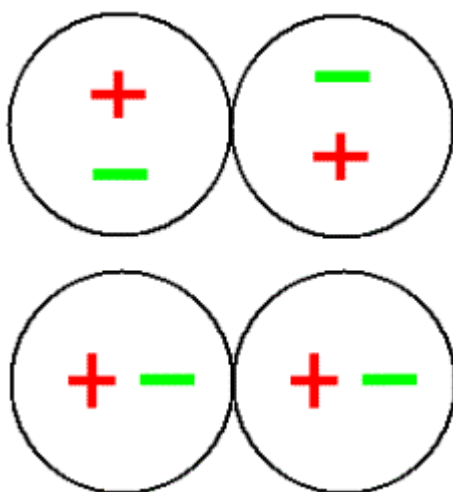




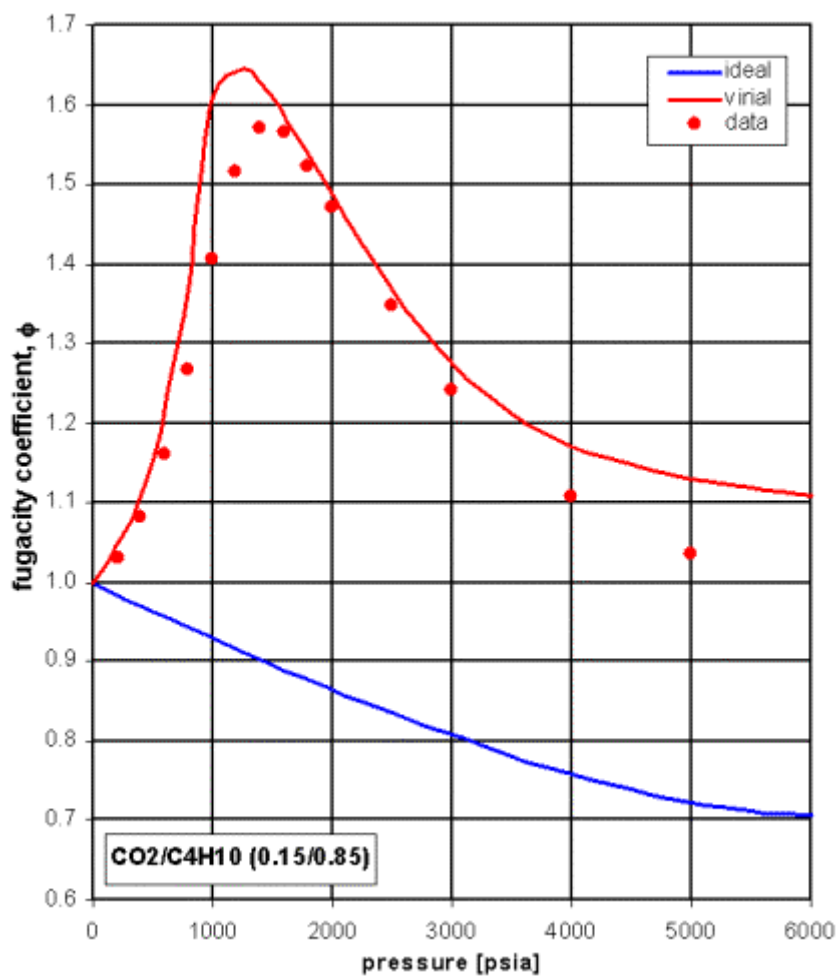


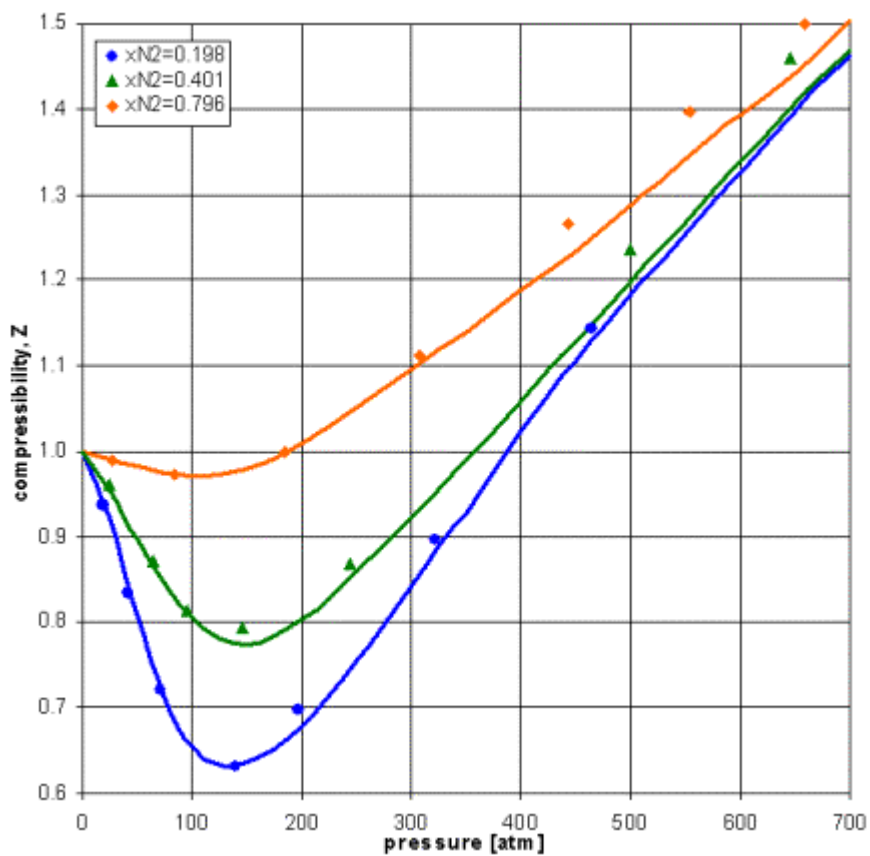


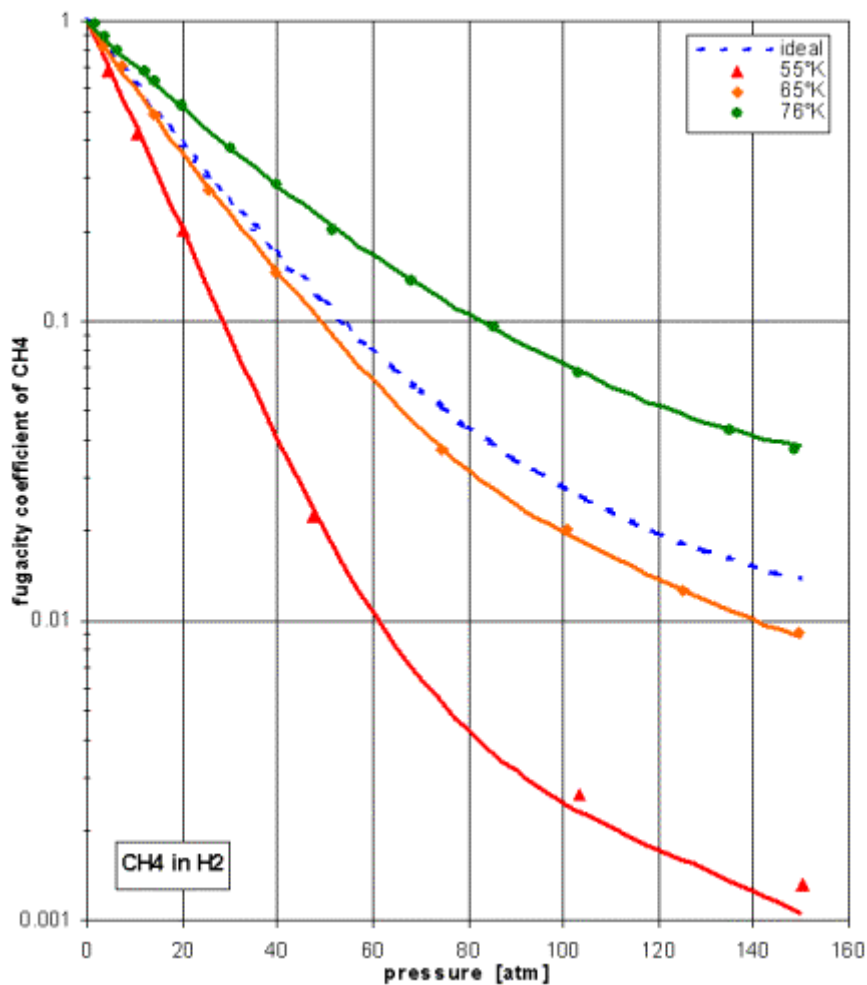


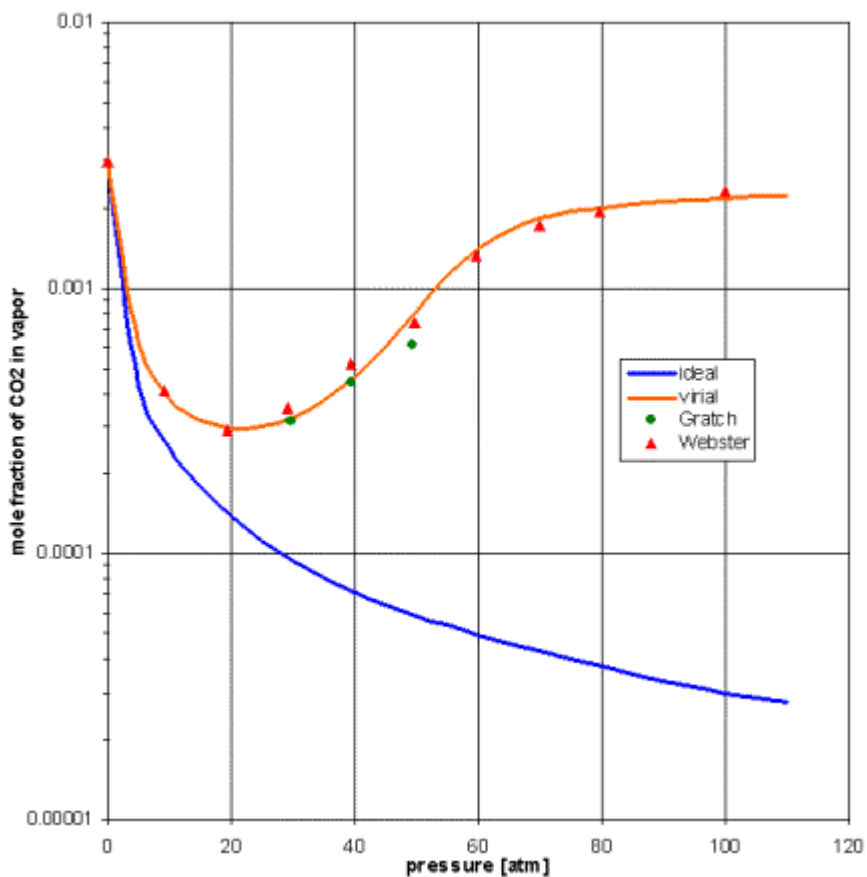


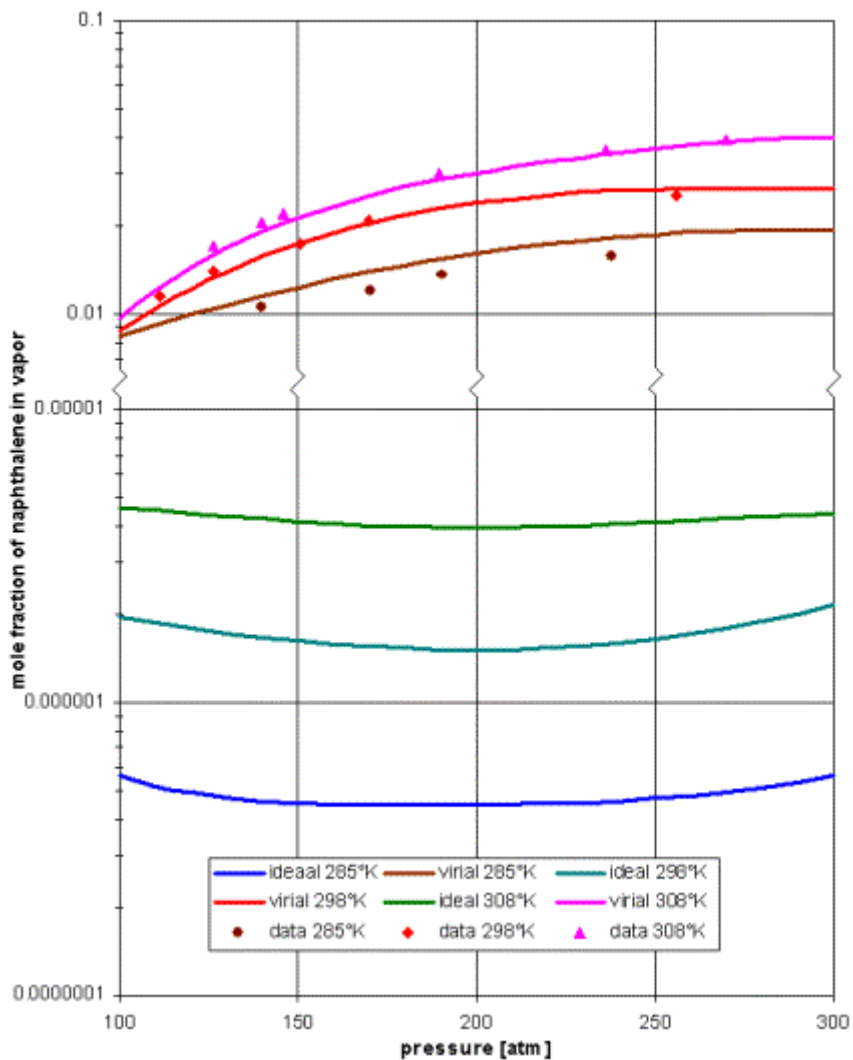
polar particle packing

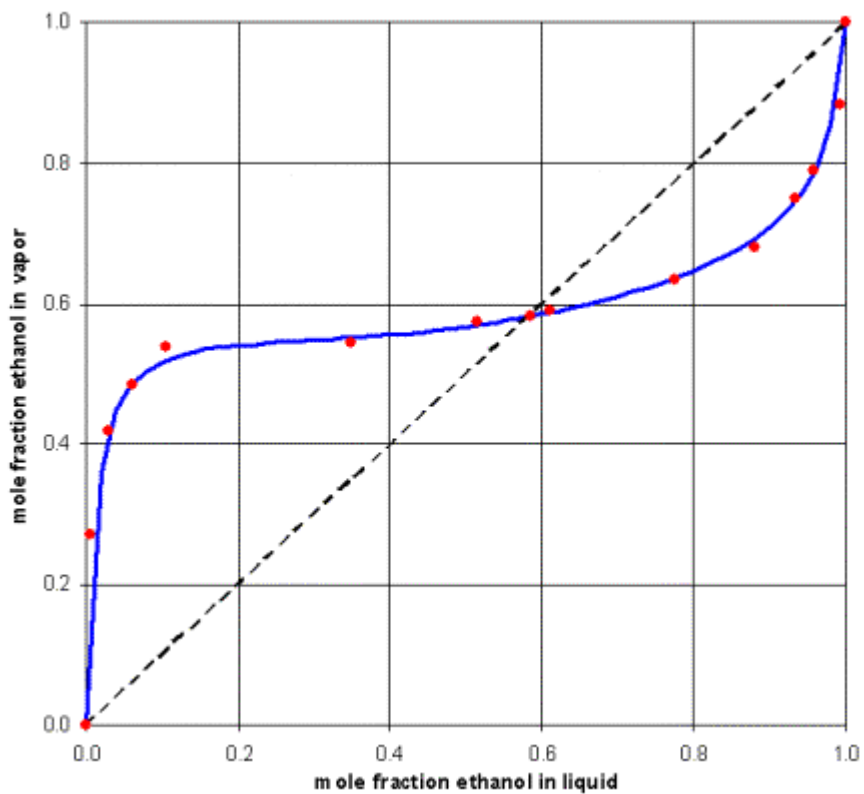


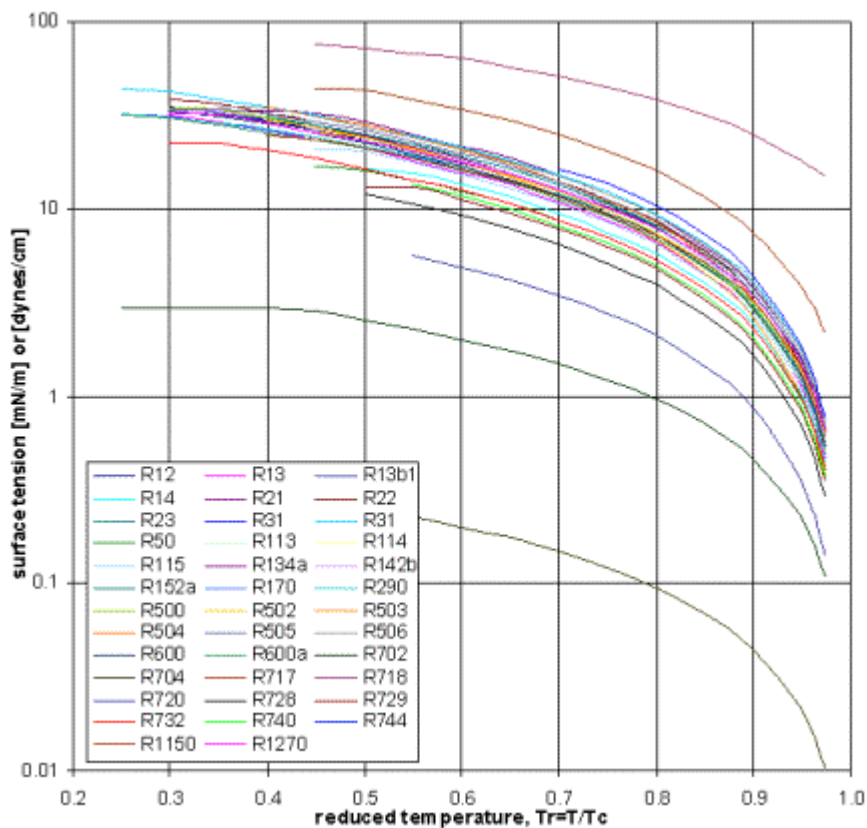


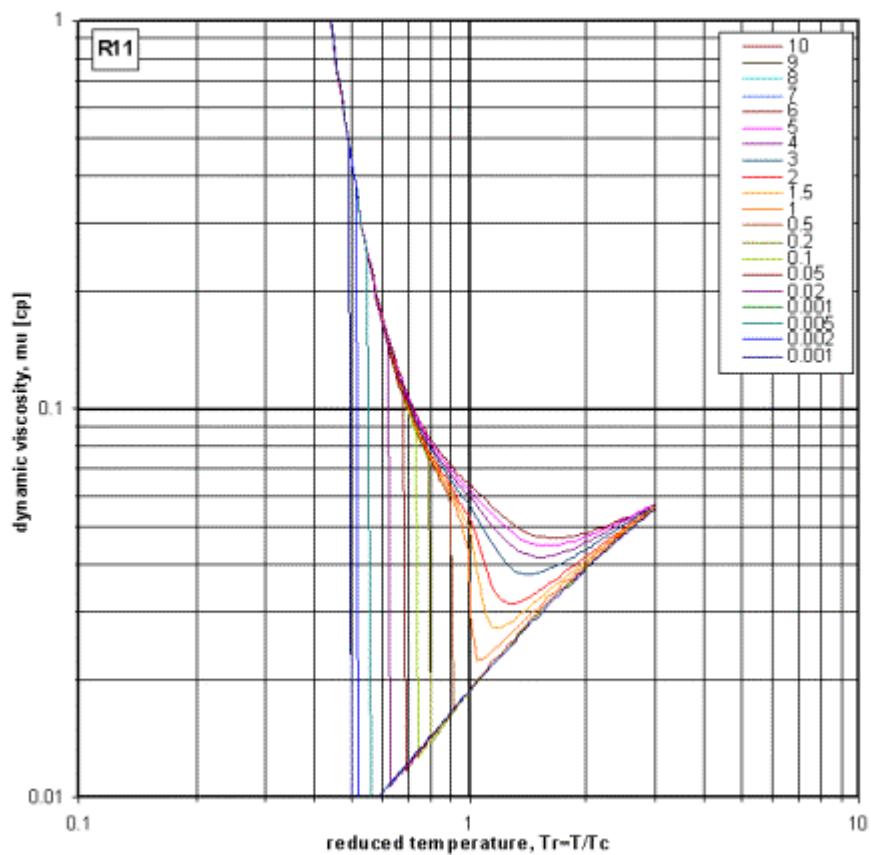


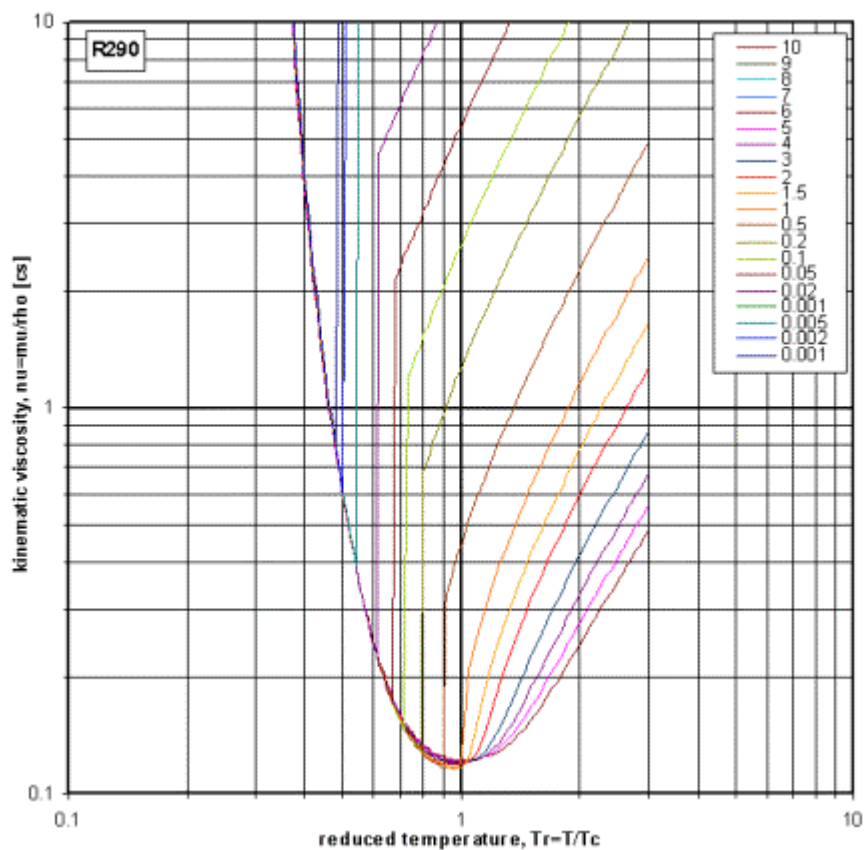


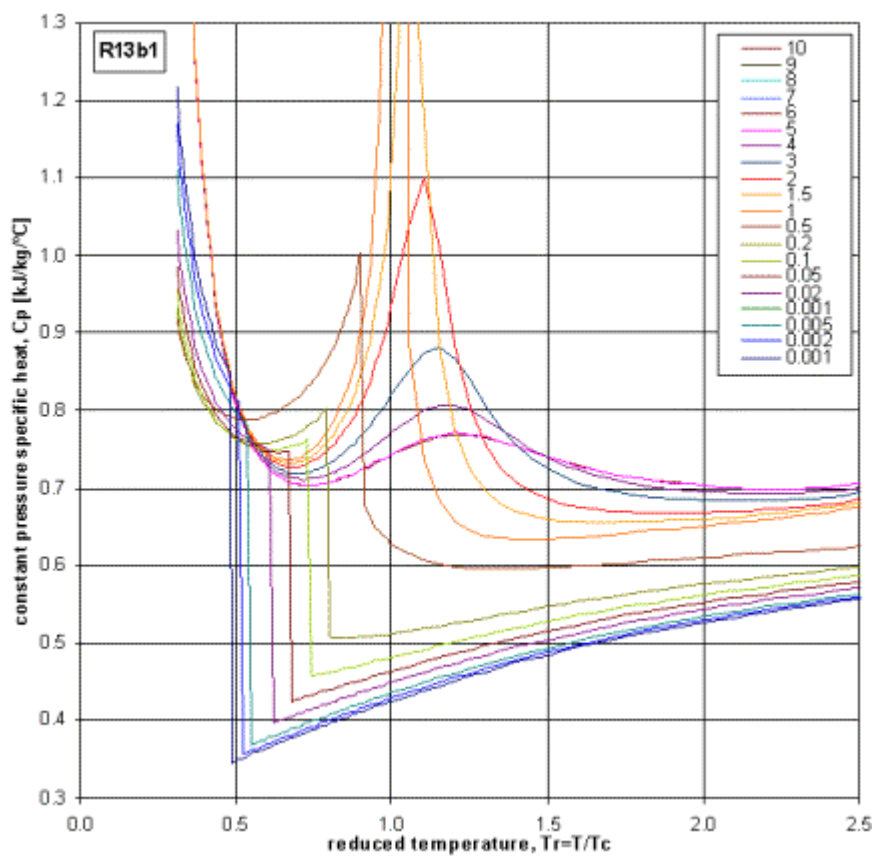


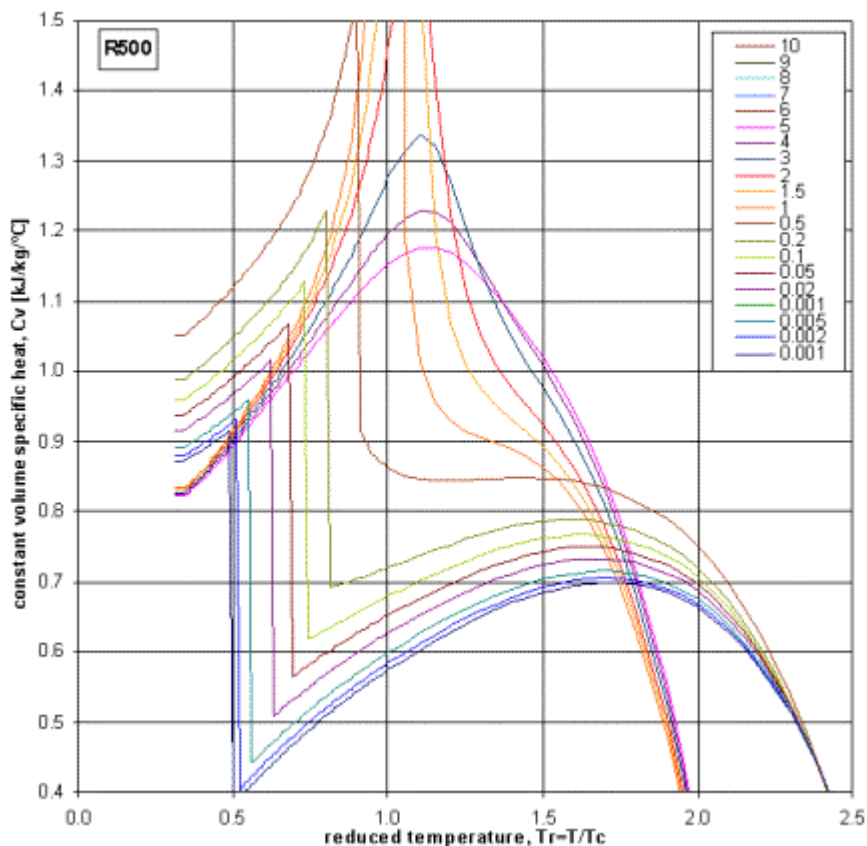




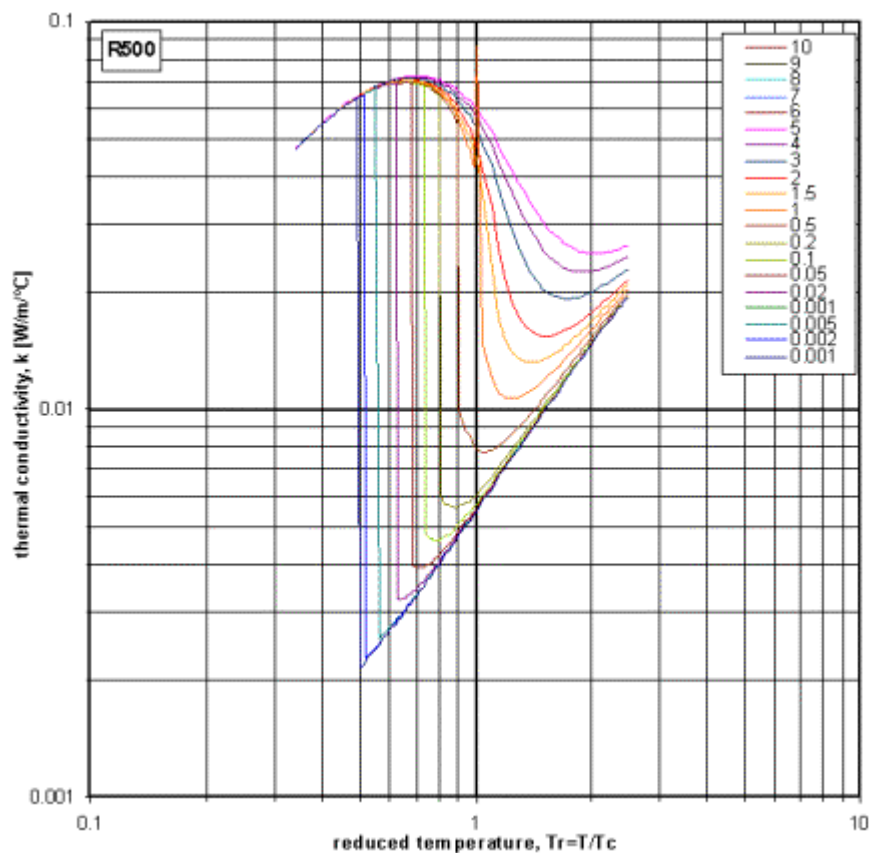




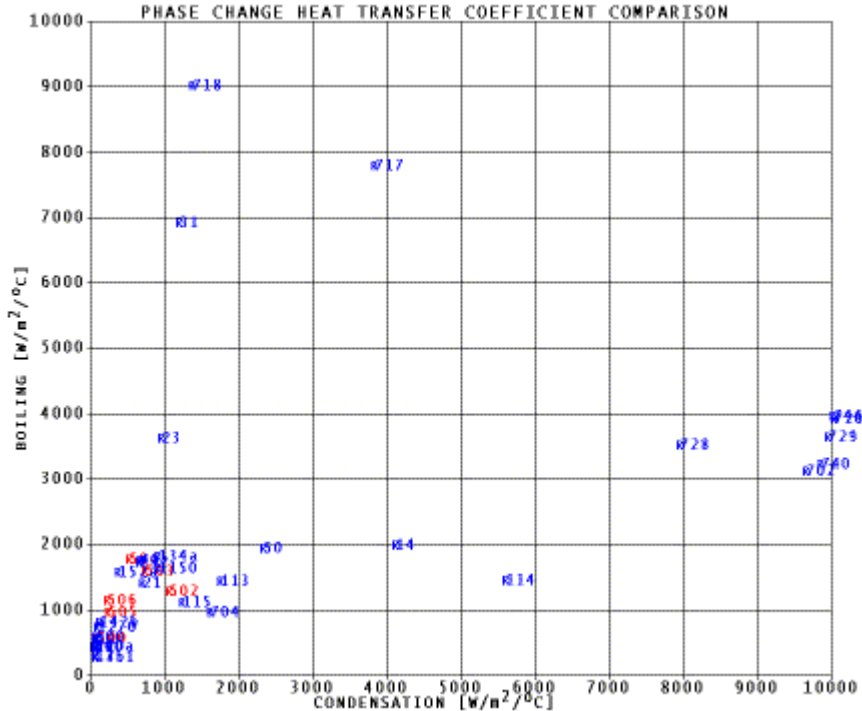




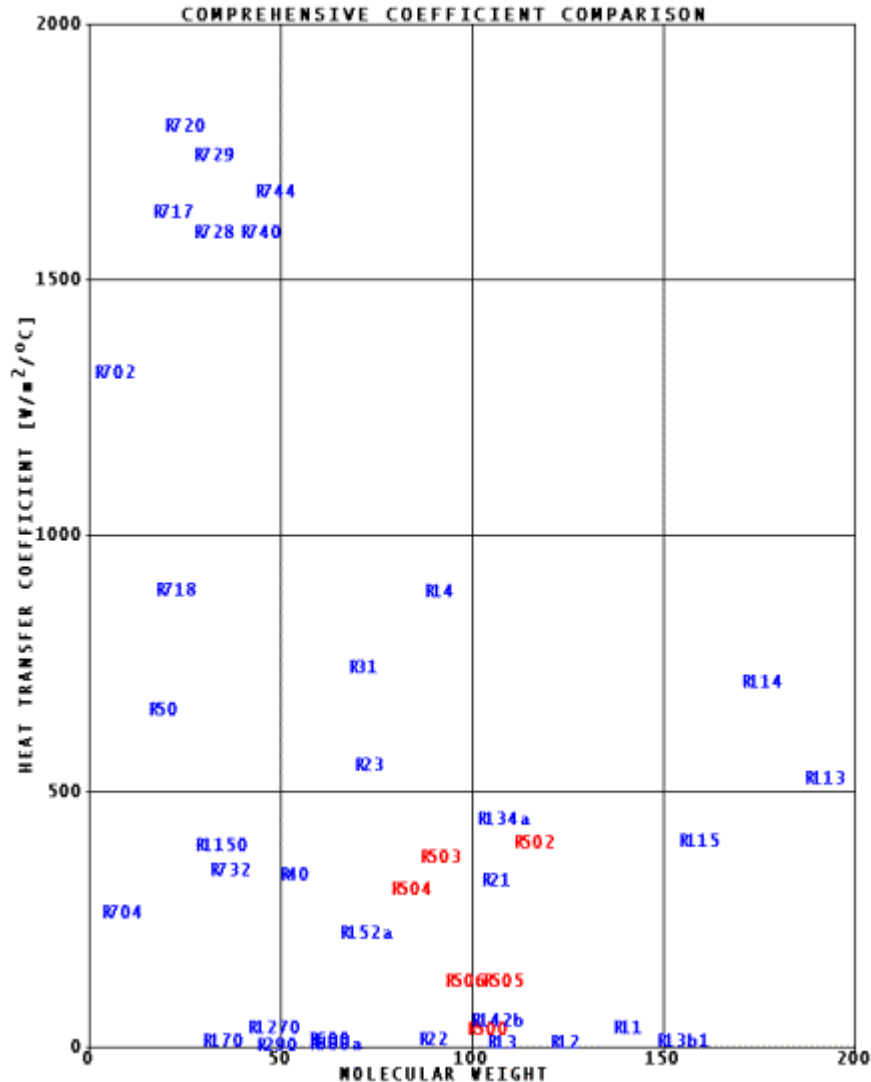
Convective Heat Transfer Coefficient Comparison



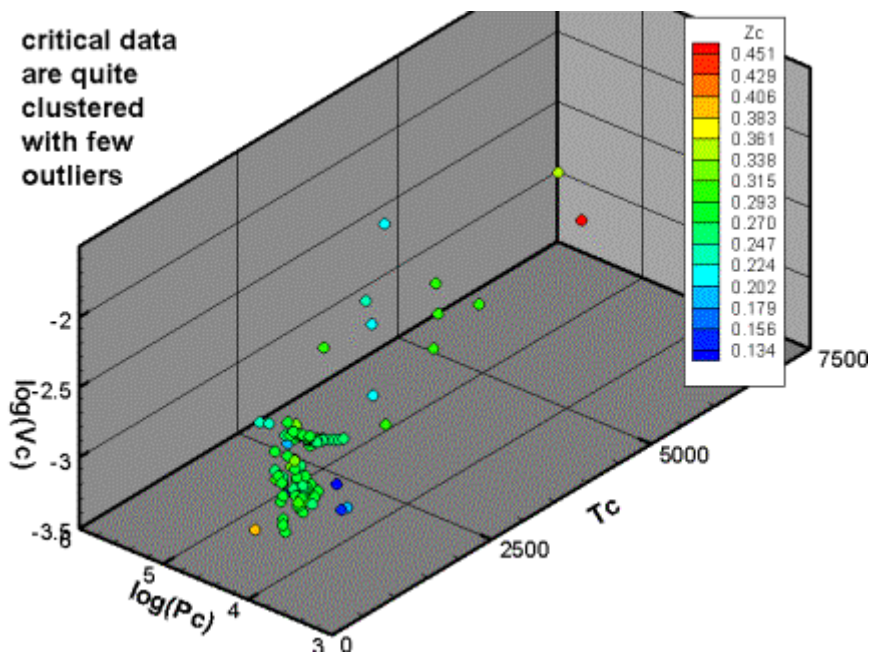
PHASE CHANGE HEAT TRANSFER COEFFICIENT COMPARISON



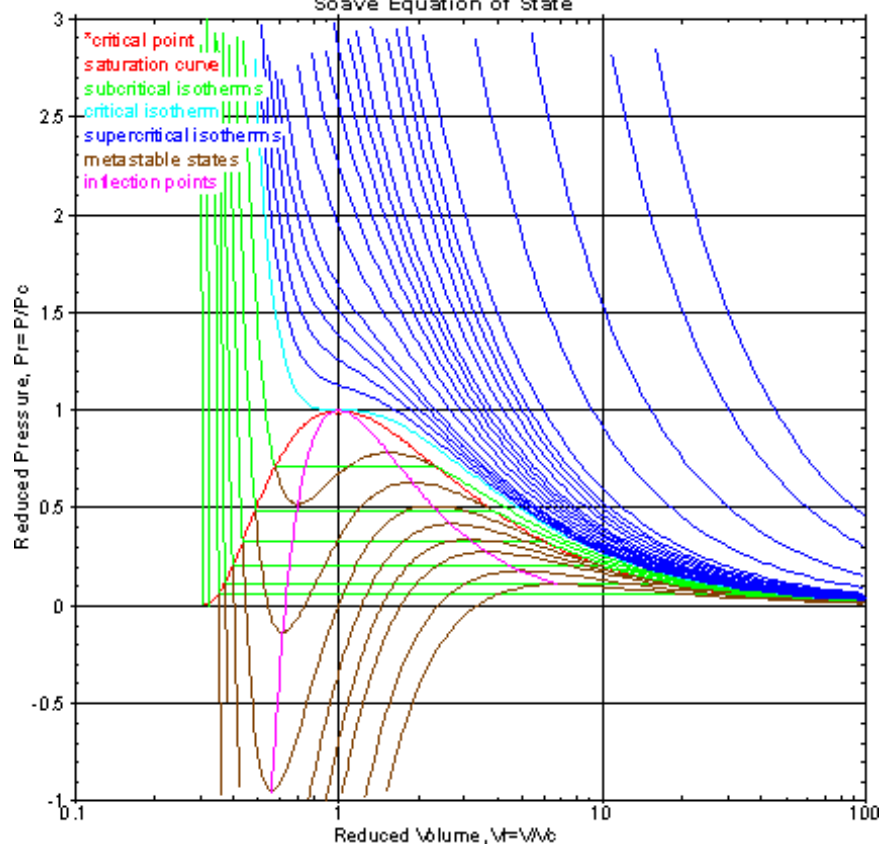
COMPREHENSIVE COEFFICIENT COMPARISON



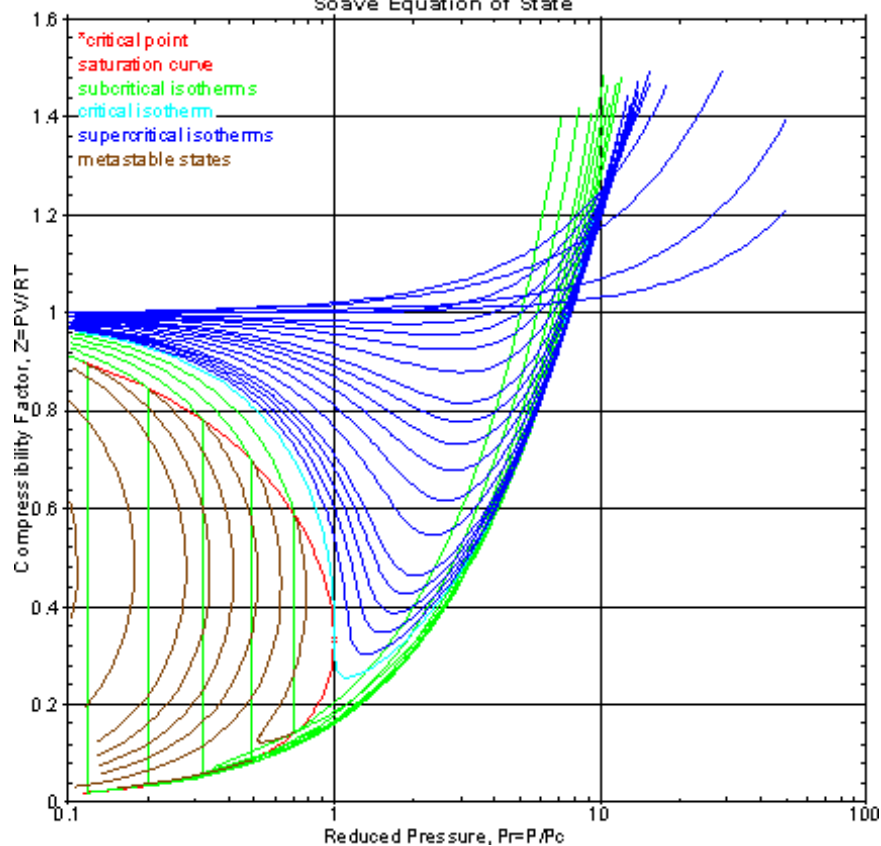
critical data
are quite
clustered
with few
outliers



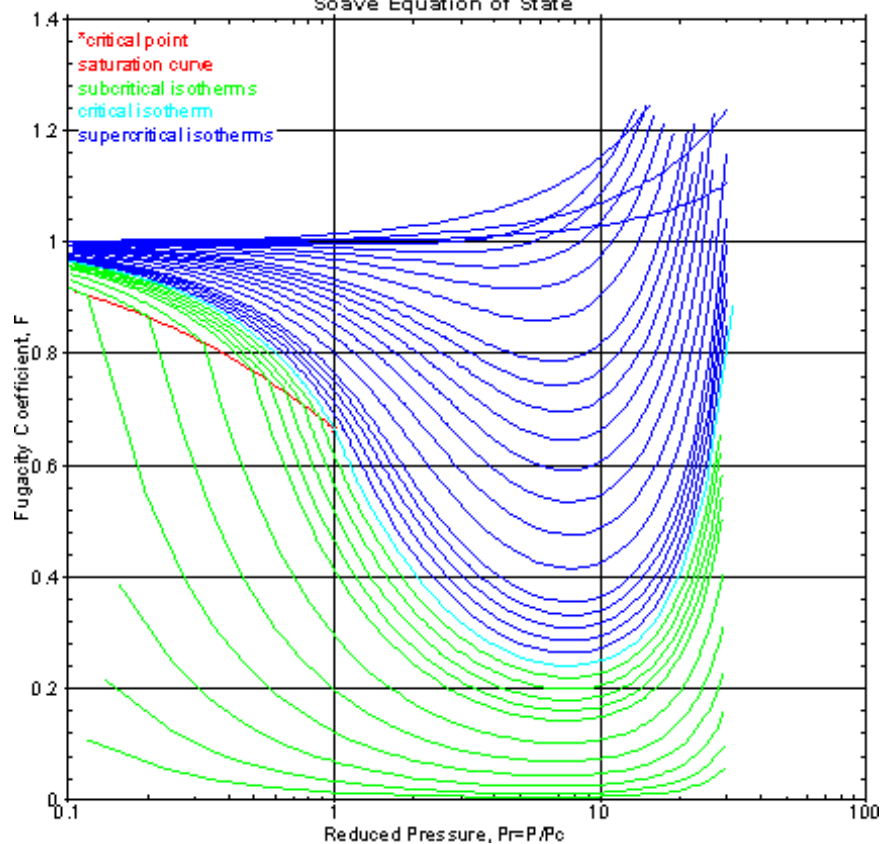
Soave Equation of State



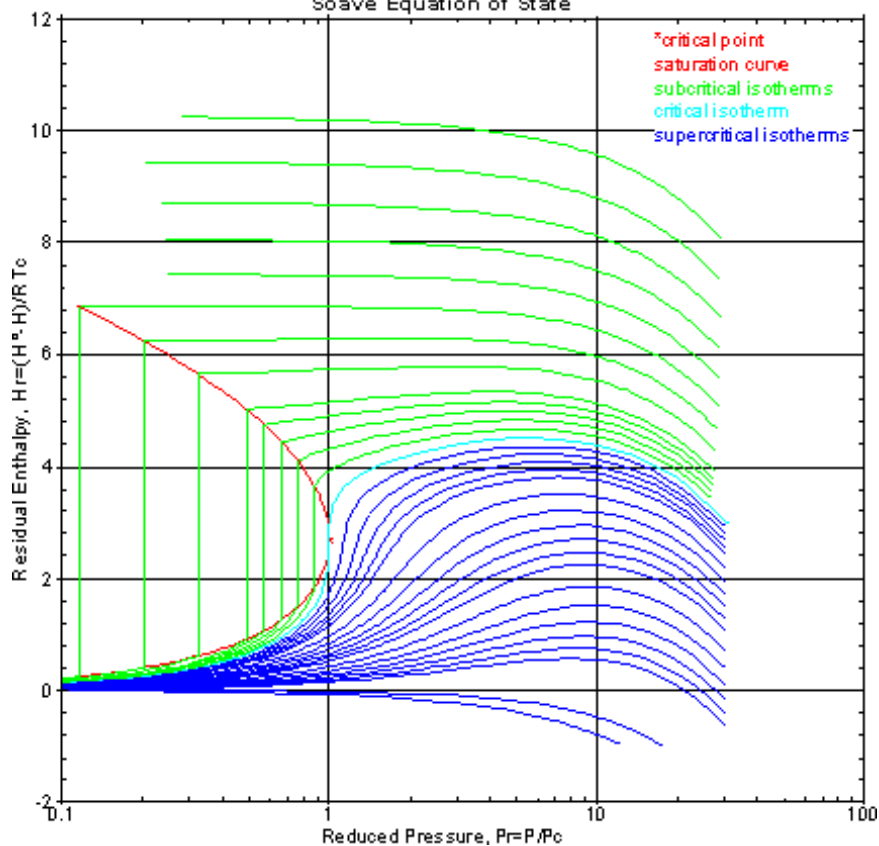
Soave Equation of State



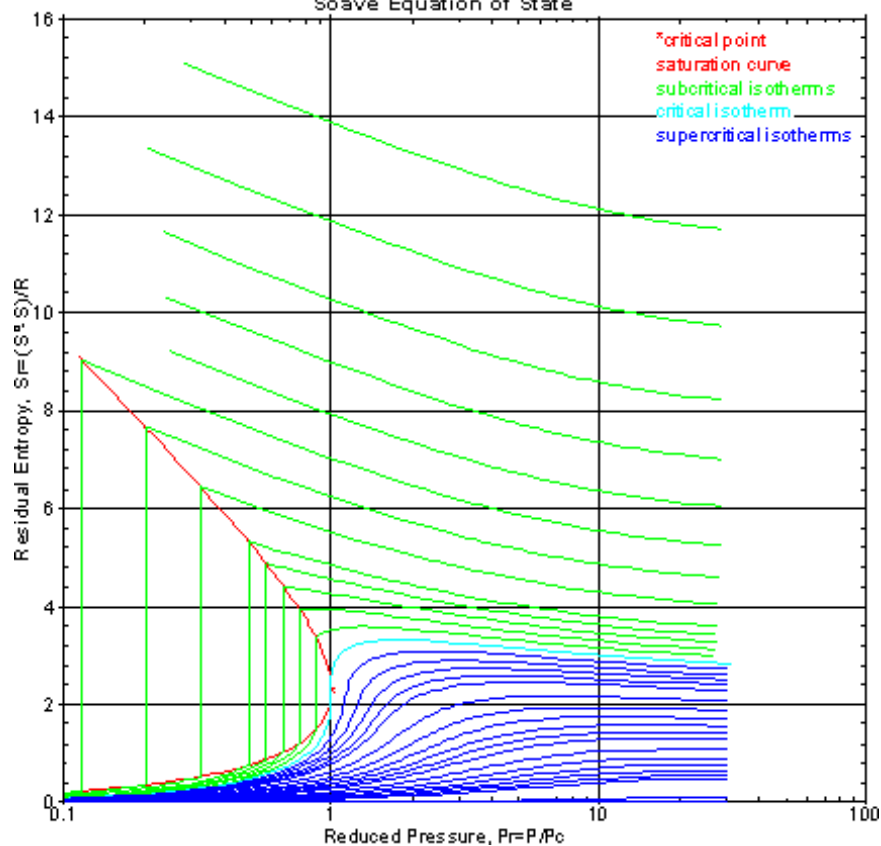
Soave Equation of State

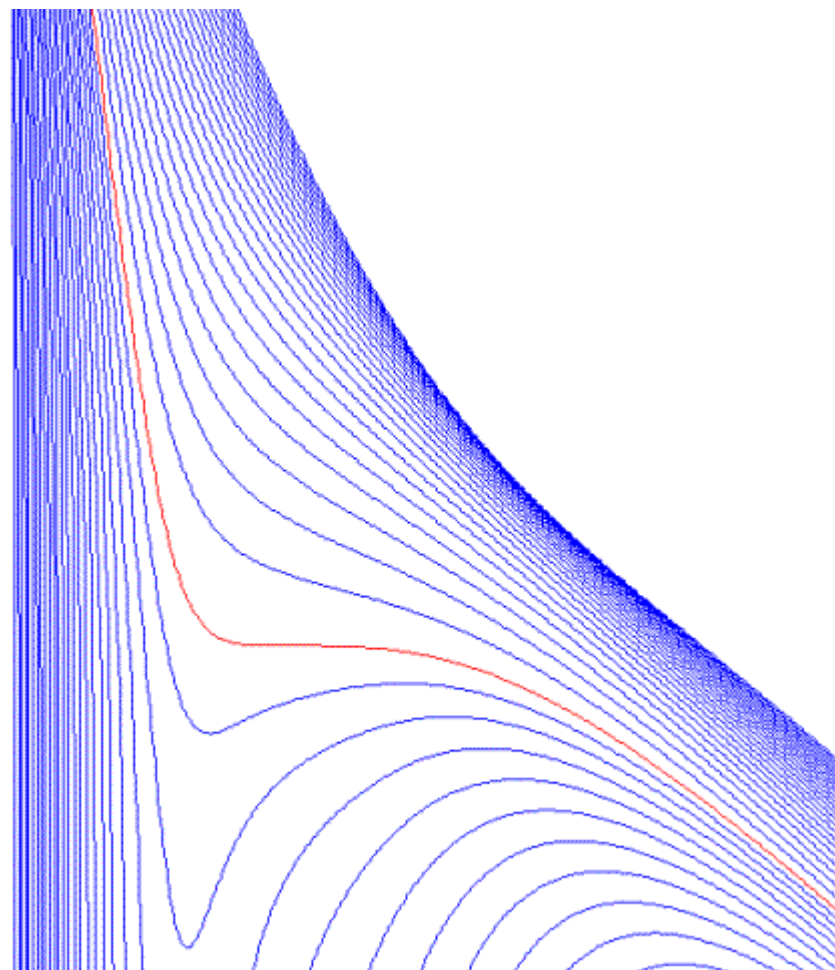


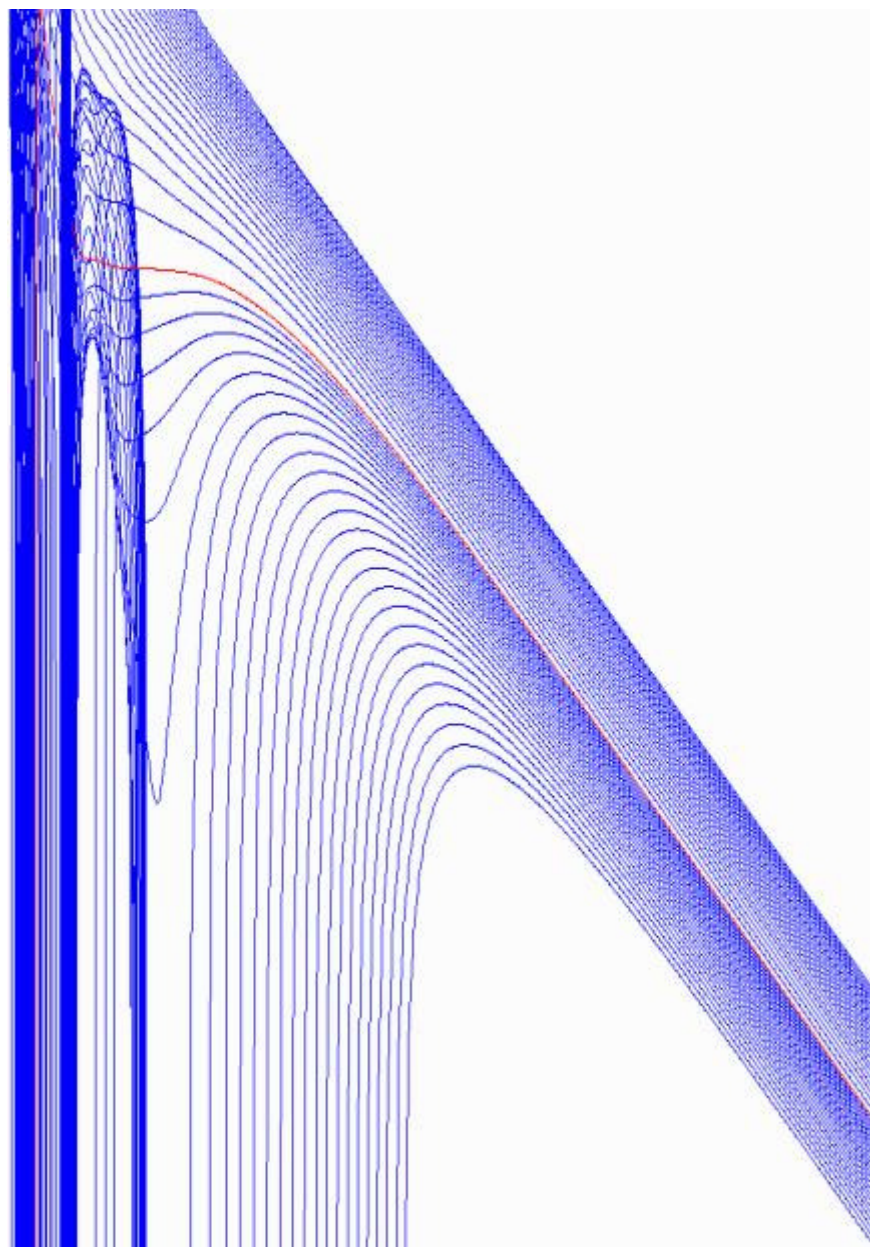
Soave Equation of State



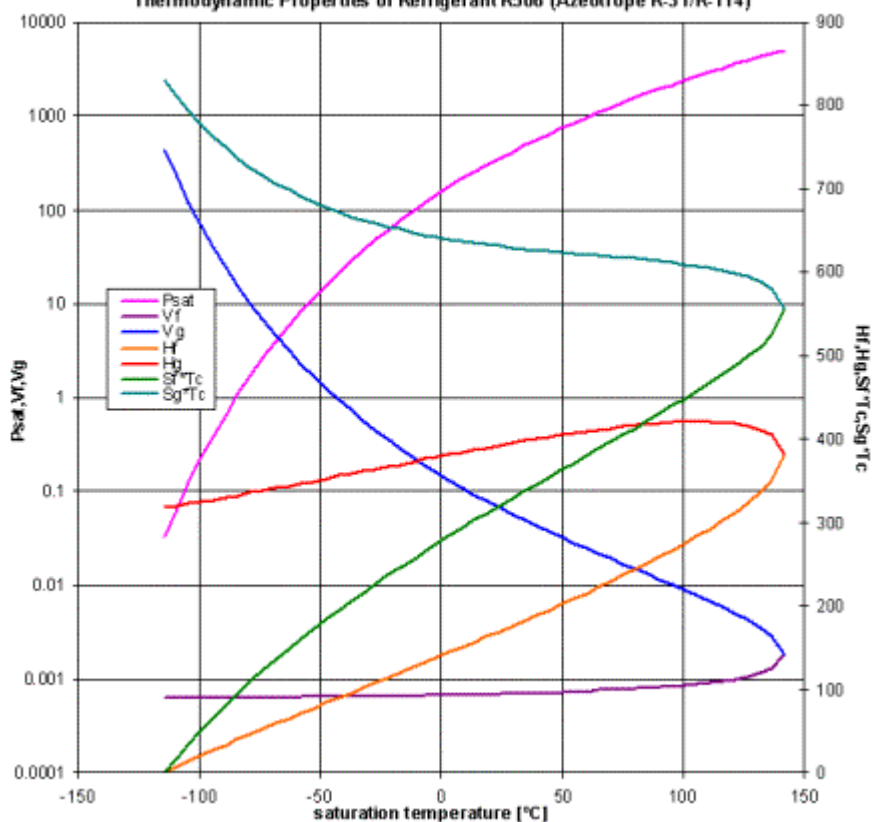
Soave Equation of State



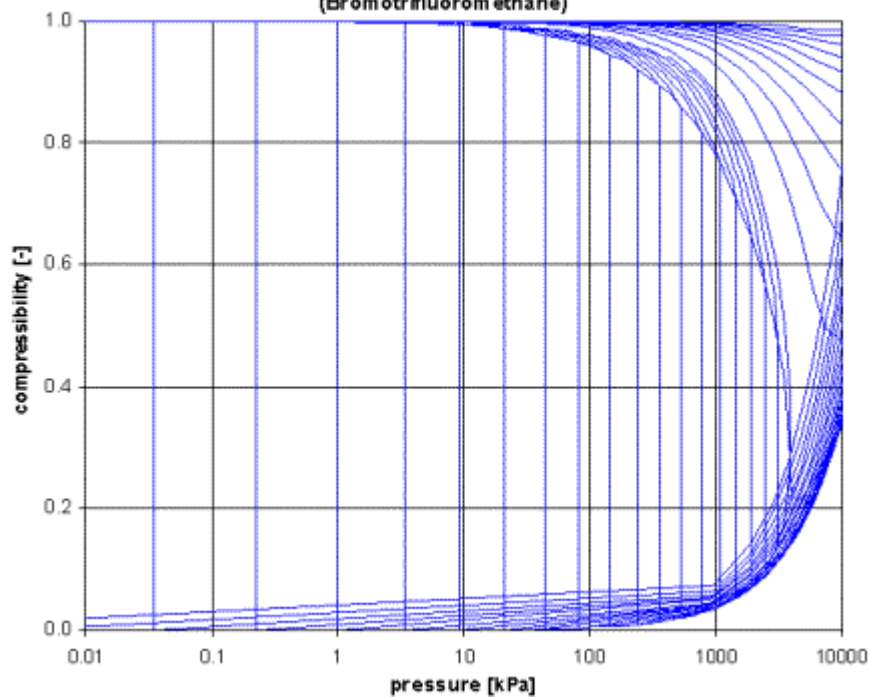




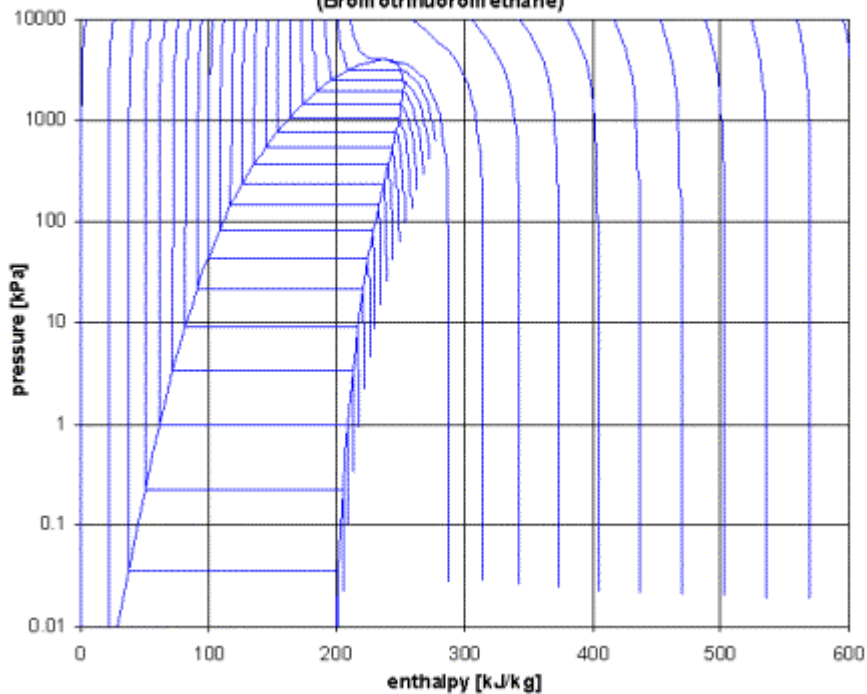
Thermodynamic Properties of Refrigerant R506 (Azeotrope R-31/R-114)



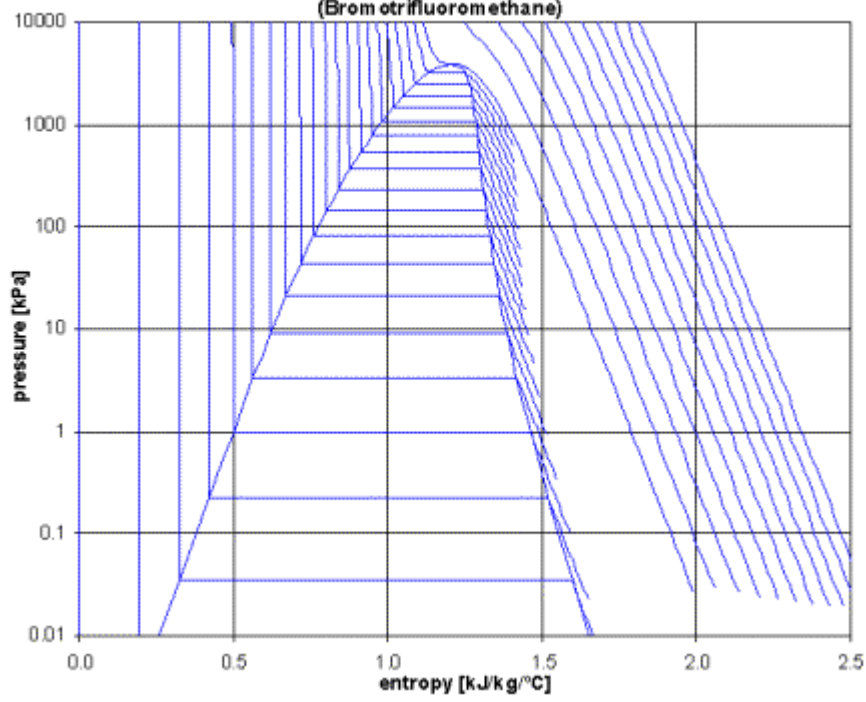
Thermodynamic Properties of Refrigerant R13b1
(Bromotrifluoromethane)



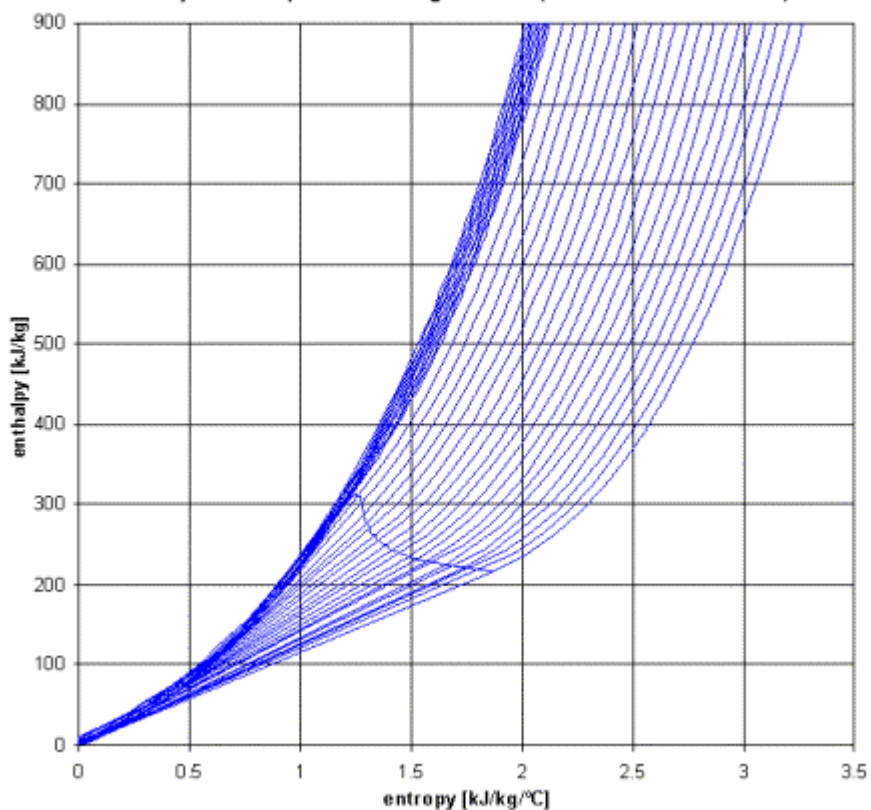
Thermodynamic Properties of Refrigerant R13b1
(Bromotrifluoroethane)



Thermodynamic Properties of Refrigerant R13b1
(Bromotrifluoromethane)



Thermodynamic Properties of Refrigerant R12 (Dichlorodifluoromethane)



Thermodynamic Properties of Refrigerant R22 (Chlorodifluorom ethane)

