

Advanced Distillation Curve Measurement: Case Studies on Complex Fluids

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In a previous presentation, a number of improvements in the method and apparatus used for the measurement of distillation curves for complex hydrocarbon fluid mixtures were presented. These improvements included the addition of a composition-explicit channel of data, improved temperature control and measurement, and improved and less uncertain volume measurement. In this talk, we demonstrate the improved approach with applications to four families of complex hydrocarbon fluids: Rocket Propellant 1 (RP-1), the jet fuel JP-8, a synthetic JP-8 that is designated as S-8, and three mixtures of gasolines. RP-1 is a long-established hydrocarbon fuel that continues to be widely used since it was first developed in the 1950's. Modern versions of this fluid are produced from a narrow-range kerosene fraction that is processed to reduce unsaturated compounds and sulfur-containing hydrocarbons. S-8 is a synthetic substitute for fluids such as JP-8 (and its closely related commercial analog, Jet-A). It is produced by the Fischer Tropsch process from natural gas. The gasolines are based on 91 ROM fluids, and include formulations with methanol. As these new and reformulated fluids gain increasing application, especially in aviation/aerospace, it will be increasingly important to have material characterization test procedures that are reproducible and have a sound and fundamental basis. This will allow modeling of the properties and guide further refinement of the fluids.