Four Pieces of a Four Piece Puzzle: The Composition Explicit Distillation Curve Method with the Addition of Liquid Composition

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One of the most important and informative properties that is measured for complex fluid mixtures is the distillation (or boiling) curve. We recently introduced an improved method, called the composition-explicit or advanced distillation curve (ADC). The ADC approach addressed many of the shortcomings of the classical distillation method described above. Sampling very small distillate volumes (5 to 25 µL) yields a composition-explicit data channel with nearly instantaneous composition measurements. Chemical analysis of the distillate fractions allows for determination of how the composition of the fluid varies with volume fraction and distillation temperature, even for complex fluids. These data can be used to approximate the vapor liquid equilibrium of complex mixtures, and presents a more complete picture of the fluid under study. A limitation of the approach has been the inability to measure the liquid phase composition as part of the distillation curve. In this talk, we present a modification to the ADC in which a reflux channel is added. This modification allows direct access to the liquid composition. We will discuss results with a binary mixture (n-decane + n-tetradecane) and some preliminary measurements with diesel fuel.