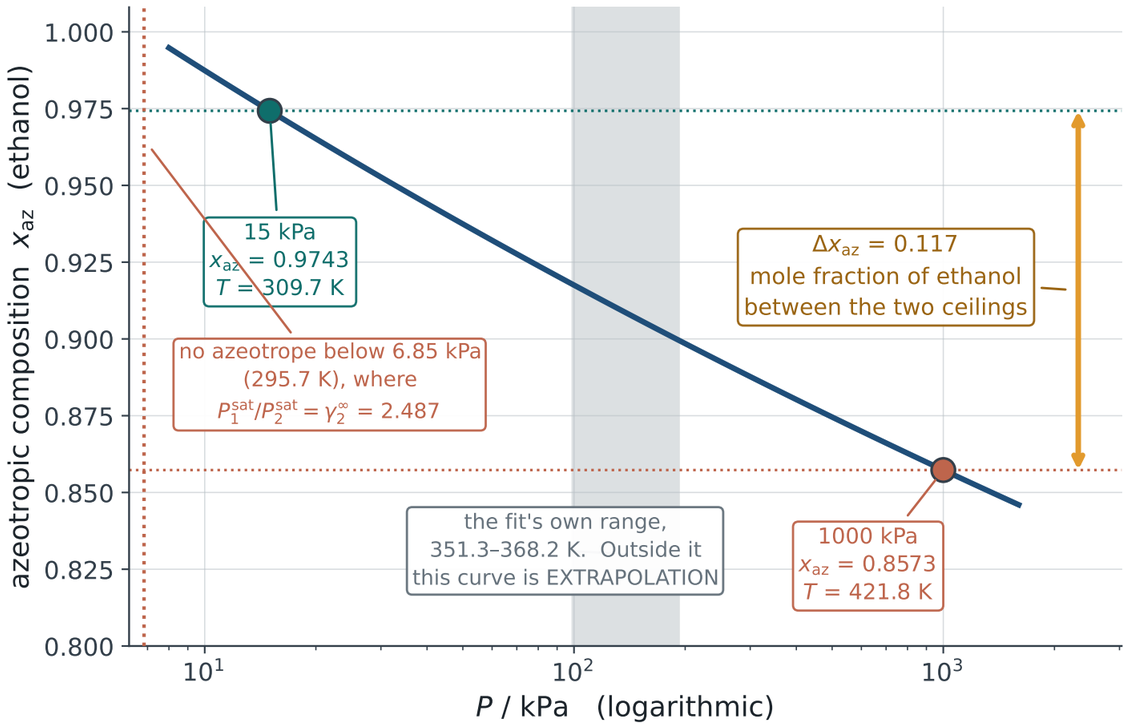
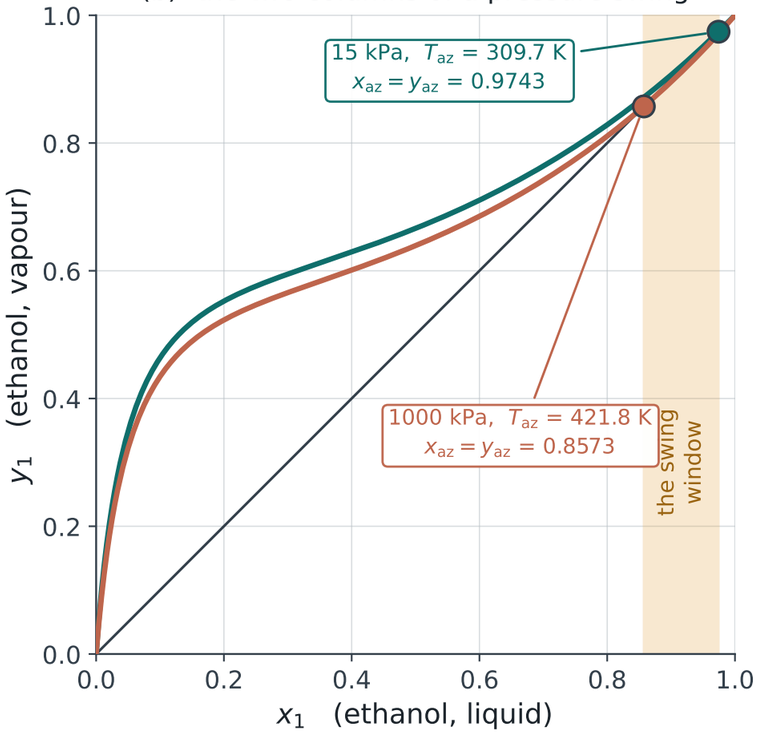
Pressure-swing distillation of ethanol + water: the azeotrope is a property of the pressure, not of the mixture

(a) where the azeotrope sits, as a function of pressure



(b) the two columns of a pressure swing



MODEL: NRTL (α = 0.3, τ_{12} = -0.1712, τ_{21} = +1.9330) fitted by Barker's method to Kamihama et al. 2012, doi:10.1021/je2008704 — 21 points, 101.3 kPa, 351.3–368.2 K, rms δT = 0.059 K. P_i^{sat} from vlekit.data.LIBRARY.

THE PARAMETERS ARE HELD FIXED AS P IS VARIED. τ_{ij} carries no temperature dependence of its own, so in this calculation the whole shift comes from $P_1^{sat}/P_2^{sat}(T)$; the real G^E also changes with T, and a fit at one pressure cannot know how.

For scale: at 101.3 kPa this model puts the azeotrope at x_1 = 0.9172 where the published table gives 0.8946, a difference of 0.0226 in mole fraction.