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Controlling the wetting and evaporation dynamics of non-ideal volatile binary solutions[1] PIERRE COLINET, SENTHIL KUMAR PARIMALANATHAN, SAM DEHAECK, ALEXEY REDNIKOV, Université Libre de Bruxelles — Volatile binary liquid samples on wetting substrates are known to be subject to solutal Marangoni stresses fomenting either spreading or contraction tendencies, which depends on whether it is the more "volatile" component that possesses a lower surface tension or not, respectively. We run experiments with sessile droplets (isopropanol-water and ethanol-water) for multiple combinations of the initial concentration in the liquid and controlled ambient humidity (water vapor only) essentially covering the entire admissible range of these parameters. Surprisingly, contraction regimes are thereby found for certain parameter ranges, in spite of the alcohols being more volatile than water. Furthermore, regime reversals occur for different liquid concentrations even at zero humidity. To rationalize these observations, a simple model is built highlighting the often overlooked role of the diffusion coefficient ratio of the two vapors and the non-ideality of the mixture. To emphasize the universality of our picture of the phenomenon, experiments are also conducted in other setups: drops with pinned contact lines and tears-of-wine menisci, drops with added microparticles and their deposition patterns.

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