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An evaporation model of multicomponent solution drops SILVANA SARTORI, Mech. and Aerospace Eng Dept. University of California San Diego, AMABLE LIÑÁN, Escuelta Técnica Superior de Ingenieros Aeronáuticos. UPM (Spain), JUAN C. LASHERAS, Mech. and Aerospace Engr Dept. UC San Diego
— Solutions of polymers are widely used in the pharmaceutical industry as tablets coatings. These allow controlling the rate at which the drug is delivered, taste or appearance. The coating is performed by spraying and drying the tablets at moderate temperatures. The wetting of the coating solution on the pill's surface depends on the droplet Webber and Re numbers, angle of impact and on the rheological properties of the droplet. We present a model for the evaporation of multicomponent solutions droplets in a hot air environment with temperatures substantially lower than the boiling temperature of the solvent. As the liquid vaporizes from the surface the fluid in the drop increases in concentration, until reaching its saturation point. After saturation, precipitation occurs uniformly within the drop. As the surface regresses, a compacting front formed by the precipitate at its maximum packing density advances into the drop, while the solute continues precipitating uniformly. This porous shell grows fast due to the double effect of surface regression and precipitation. The evaporation rate is determined by the rates at which heat is transported to the droplet surface and at which liquid vapor diffuses away from it. When the drop is fully compacted, the evaporation is drastically reduced.

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