Evaporation from Porous Media

We have a porous material that is filled with a liquid solution containing molecules from multiple species with known concentrations. As the solvent evaporates these molecules are left behind on the internal pore walls within the porous material.

- We would like to develop a mathematical model for the mass distribution of these molecule species within the porous material structure after all the solvent has evaporated completely given the porosity, pore size distribution, starting concentrations of species, and solution properties (density, viscosity, and surface tension).

As a bonus problem, we would we interested in potential changes to the morphology of the porous material due to the forces applied to the pore structure by the evaporating solvent and its capillary forces.

- We would like to develop a simple mathematical model for the structural changes (thickness, pore size, porosity) given the original structure and properties of the solvent (viscosity and surface tension) depending on the evaporation rate of the solvent.