

## **Abstract**

Saponins are naturally occurring glycosides found in many plant species, best known for their foaming properties, but have many other beneficial effects, including anti-carcinogenic effects, as well. Even though saponins can be found in wide variety of plant species, such as quinoa and grapes, the concentration of saponins found in most other species is scarce. Prior studies showed that grapes, one of the most produced fruit in the world, contain saponins. With an efficient extraction method, grapes can be a good source from which to extract saponins in the future. The goal of this project is to study the diffusion of saponins in quinoa and grapes in order to better understand the extraction process. A mathematical model of diffusion of saponins was developed from the Conservation of Species equation. The extraction of saponins from the seeds of quinoa and grape pomaces was modeled as an unsteady-state mass transfer process, and was simulated using COMSOL Multiphysics. Plots of concentration vs. time were obtained for different temperatures and radii to study their effects on the saponin concentration behavior. By performing a parametric sweep over different diffusivities, the effect of different diffusivities on the saponin concentrations was investigated. Finally, two kinetic models were used to fit the simulation data to the kinetic equations for comparison.