

# Freeze-Drying

**TO: Engineering Development Branch**

**FROM: Engineering Division**

**SUBJECT: Freeze-Dryer**

The company is developing freeze-dried orange juice as a new product and needs some insight into the process. A surrogate material for equipment acceptance testing should have less variability than orange juice. Your assignment is to use the small-scale freeze dryer to investigate the drying rates of water and a 10% solution of glucose in water.

Develop a fundamental model that predicts the mass loss during freeze-drying. Use the results and the model to determine if mass transfer, heat transfer, or a combination of mass and heat transfer are the dominant factors that limit the drying process. Based on this information, discuss methods that could accelerate the freeze-drying process and demonstrate the effectiveness experimentally.