

Rasic - Chemistry

Abstract: Heavy metals such as Cr, Ni, Pb, and Cd can be contained along with the pesticides within grapes as a result of growth on contaminated soil, pesticide application and transport and storage in contaminated containers. A common food that is produced from grapes is balsamic vinegar. Conventional vinegar is produced in a highly industrialized process involving stainless steel vessels, but traditional balsamic vinegar is known to be aged in wooden oak barrels according to a prescribed procedure. The oak barrels are often held together by lead cladding and no data are available until now whether during the aging process some leaching of lead occurs into the vinegar. The goal for this study is therefore to analyze the concentrations of heavy metals, specifically lead, and pesticides during the fermentation process of balsamic vinegar in different vessels and at various stages of maturation. The balsamic vinegar for this study will be made using four different containers: oak barrels, glass contains, aluminum, and plastic. Differences from the various containers will indicate if pesticides and heavy metals are present based on storage and fermentation environment. In this project, GC-MS will be used to analyze the types of pesticides within the brewed balsamic vinegar and the analysis of heavy metals will be performed using ICP-MS and AAS.

Undergraduate Work: My mentee will help prepare the different samples to be analyzed every week. The process will require for the student to extract the samples, prepare standards and measure them with different instruments under my supervision. Once the instrument measurements are completed, I will evaluate the data with the student every week as well. The undergraduate student will be able to interpret the data themselves weekly and report the results to me. We will go over the results together every week once the student interprets the results.