

2. Learning Objectives

- a. *Literature Searching*: Given a specific component of a beer sample, search the scientific literature for a published method compatible with the instrumentation and supplies available.
- b. *Method Selection*: Evaluate the pros and cons of different methods and choose the best one.
- c. *Budgeting and Ordering*: Create a list of supplies, identify amount required and manufacturer, and determine overall cost.
- d. *Sample Preparation*: Develop a procedure for sample preparation by following and/or adapting literature protocol.
- e. *Accurate Preparation of Standards*: Design a procedure to prepare standards by following and/or adapting literature protocol.
- f. *Selection of Calibration Method*: Identify and utilize the most appropriate calibration method for the analysis based upon the sample matrix and analytical method. The use of internal standards and/or standard addition should be considered.
- g. *Troubleshooting*: Adapt the procedure to solve experimental problems as they arise. Identify and solve errors with instrumentation such as a clogged column, low lamp intensity, misaligned burner, etc.
- h. *Teamwork*: Communicate with group members in the execution of the project and negotiate when making important decisions to move the project forward.
- i. *Ethics*: Employ ethical practices in the utilization and interpretation of data. This is especially important because the brewery will make decisions about production based upon the data reported.
- j. *Reporting of Data*: Collect and present data in graphical and other appropriate forms. This includes calculating the concentration of the analyte in the samples and reporting uncertainty in individual results as well as pooled class results.
- k. *Interpretation of Data*: Draw conclusions about the accuracy, precision, and reliability of the results.
- l. *Scientific Communication*: Work collaboratively with group members to create and present a scientific poster.
- m. *Future Work*: Recommend future directions for the project.

