

## ABSTRACT

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Title: THE CHEMISTRY OF BREWING: EXPLORING THE SYNERGISTIC RELATIONSHIP BETWEEN SCIENCE EDUCATION AND BEER

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Chemistry labs were designed in order to measure three distinct parameters of beer: the hydrogen ion content (pH), percent alcohol by volume (ABV%) and International Bitterness Units (IBU). These values were measured for a total of 15 beer samples from local Connecticut microbreweries, continuing the work of a previous Southern Connecticut student, Asher Brandt. The methodology for each experiment was first developed and verified by obtaining values for Sam Adams Lager and comparing to actual values provided by the brewery. The experimental samples were then sorted into groups based on their primary beer style. The ales in this study had an average pH of  $4.51 \pm 0.36$ , an average ABV of  $5.5 \pm 1.3\%$ , and average IBUs of  $36.50 \pm 20.69$ . The lager group only consisted of one sample with a pH of 4.35, 4.7% ABV and 10.01 IBU. There was also only one stout available for measure which revealed a pH of 4.28, 5.5% ABV and 26.56 IBU. A group of “heavier” IPA’s was also formed which had measured averages of pH  $5.07 \pm 0.04$ ,  $9.0 \pm 0.40\%$  ABV and  $94.86 \pm 0.86$  IBU. The final group included sour beers which had a pH  $3.49 \pm 0.20$  and  $3.8 \pm 0.5\%$  ABV (IBU measurements were not taken for these samples). The data revealed that these methods were successful in collecting measurements close to the actual values – allowing one to correctly identify a given unknown sample of beer using the procedure disclosed. Furthermore, this research provides evidence of how a college laboratory can benefit from utilizing these proven methods in teaching various concepts in a chemistry curriculum.