

ASBC METHOD HIGHLIGHT: WORT-21. THIOBARBITUIC ACID INDEX

The thiobarbituric acid index test (TBI) is a useful test that, although classified as a wort method, may also be utilized for analyzing beer. TBI is a colorimetric analysis used to analyze the thermal stress the beer or wort has been subjected to during processing that can impact the flavor stability of the beer. This test is often used when a brewer is working towards adding capacities, particularly when flavor matching a new brewhouse. Lower values indicate lower thermal stress and higher values indicate higher thermal stress.

While the TBI test does not require any specialized equipment—a 448 nm UV-Vis instrument is all that is needed—it can be a bit daunting the first time it is run in the lab due to several dilution steps required. The dilutions are laid out in the method quite well: a 10x dilution generally works for both beer and wort samples resulting in an absorbance in the appropriate range. It is important to note that all reagents must be prepared on the day of testing, as they are not stable for storage and the test is very aromatic due to the quantities of acetic acid being used. It is therefore beneficial to place the water bath and all glassware in a fume hood prior to beginning analysis. The test and reagents are light sensitive and the technician running the analysis may either purchase amber volumetric glassware and vials or cover each piece in aluminum foil to shield from light.

When preparing samples and reagents the analyst may find it difficult to completely dissolve the thiobarbituric acid in the 90% acetic acid. If this is the case measure the acid solid into a 250 mL Erlenmeyer flask wrapped in foil and add no more than 90 mL of 90% acetic acid. Cover and place in the warm water bath for a few minutes while swirling to dissolve. The solution may then be transferred, with rinsing with 90% Acetic acid, to the volumetric flask and brought to volume for the appropriate concentration for use in the analysis. If the lab is short on volumetric glassware, which may be expensive, the sample dilutions may be done directly into amber vials utilizing volumetric pipettes (1 mL sample, 9 mL water, and 5 mL acid reagent); just recognize that the standard error may be slightly increased—a minimum of three replicates and two blanks per sample is recommended.

After the samples have been in the warm water bath, it is critical they are cooled to 20°C efficiently and measured immediately so as to not skew the results due to light and the thermal sensitivities of the reaction. While the samples are in the bath the time should be used to set up an ice bath for cooling, warm up the lamp in the spectrophotometer, and set up a space to put the waste in a container in the fume hood after analysis. Placing a vial with approximately 15 mL of water in it along with the samples in the

water bath is useful for monitoring temperature. A thermometer may be placed in the water vial while the samples are in the warm water bath in order to monitor the consistency of the temperature. Additionally, once the samples are removed from the warm bath the thermometer may be placed in the water vial as the samples are placed in the ice bath for cooling. Once the thermometer reaches 20°C the samples may be removed from the ice bath and analyzed immediately.