

Beer Bitterness Analysis Protocol using an Eppendorf BioSpectrometer®

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Introduction

Objective

This is an official method to measure the bitterness of your beer using the IBU (International Bitterness Units) scale.

Principle

Bitter substances, primarily iso- α -acids, are extracted from the acidified sample using iso-octane. The concentration of iso- α -acids is determined using the Eppendorf BioSpectrometer at an absorbance of 275 nm.

Material and Methods

Protocol

01. If necessary, clarify the beer or wort by centrifuging for 20 minutes at 3,000 rpm.
02. Pipette 10 mL beer (or 5 mL wort and 5 mL distilled water) into a 50 mL centrifuge tube.
03. Add 500 μ L 6 N hydrochloric acid and 20 mL iso-octane (HPLC grade) and 4 glass beads.
04. Close the tube and shake vigorously for 15 minutes at 20 °C.
05. Centrifuge the tube for 3 minutes at 3,000 rpm if phase separation is incomplete.
06. On the BioSpectrometer: Under MAIN GROUPS select the BASIC folder. Under SUB GROUPS select FACTOR, STANDARD. Under METHODS select FACTOR.
07. Select the soft key EDIT to change the parameters.
Parameters:
Cuvette: 10 mm
Wavelength: 275 nm
Unit: U
Factor: 50 (beer) or 100 (wort)
Decimal places: 0
08. Save parameters using the soft key SAVE or SAVE AS.
09. Select the soft key NEXT.
10. Transfer blank (20 mL iso-octane) to cuvette optically clear at 275 nm, insert the cuvette and measure by pressing the round BLANK key.
11. Transfer sample (organic phase) to cuvette, insert cuvette in the same orientation as the blank and measure by pressing the round SAMPLE key.

IBU Calculation

The calculation can be implemented in the parameters of the BioSpectrometer via "FACTOR" (as described in step 7).
Absorbance at 275 nm x 50 (beer)
Absorbance at 275 nm x 100 (wort)

Literature

- [1] Verzele M and De Keukeleire D. Chemistry and analysis of hop and beer bitter acids. Amsterdam: Elsevier; 1991.
- [2] 2.17.1 Bittering Units (EBC). In: MEBAK Wort, Beer, Beer-based Beverages: Collection of Brewing Analysis Methods of the Mitteleuropäische Brautechnische Analysekommision (MEBAK). Freising-Weihenstephan: Self-published by MEBAK; 2013.

Ordering information

Description	Order no. international	Order no. North America
Eppendorf BioSpectrometer® basic 230 V / 50-60 Hz, mains/power plug Europe, 120 V / 50-60 Hz, mains/power plug North America	6135 000.009	6135000017
Eppendorf BioSpectrometer® kinetic 230 V / 50-60 Hz, mains/power plug Europe, 120 V / 50-60 Hz, mains/power plug North America	6136 000.002	6136000010
Eppendorf BioSpectrometer® fluorescence 230 V / 50-60 Hz, mains/power plug Europe, 120 V / 50-60 Hz, mains/power plug North America	6137 000.006	6137000014



Verified by: Research Center Weihenstephan for Brewing and Food Quality

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