Measuring Total, Permanent and Chill Haze in Beer

Summary

The formation of haze in beer can be problematic, as it affects the quality of the end product. Beer consists of various ingredients such as proteins, carbohydrates, polyphenols, fatty acids, nucleic acids, amino acids, etc. These ingredients can precipitate, and a haze or turbidity is formed. Most beers are clear at room temperature. If there are haze-producing proteins and tannins (both primarily from malt) suspended in the beer, haze particles don't form because of the warm temperature. When beer is chilled, these proteins and tannins react to clump into larger particles that are big enough to reflect light.

In this procedure you will measure total and permanent chill in beer. The difference between the two values is the chill haze value.

The Application

- Hach® Portable 2100Q or Benchtop TL2310 TL2360 ISO Turbidimeter
- Hach Sample Cells
- Ice
- Salt
- 95% Ethanol
- 2 pitchers/beakers or sonication device
- 1 x 500 mL Erlenmeyer flask
- 10 mL pipet

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Procedure

1. Obtain a beer sample.
2. Degas beer sample.
   a. Pass back and forth up to 70 times
   b. Ultrasonic
   c. Blow gas through sample with air stone
3. Measure out 200 mL of degassed beer into 500 mL Erlenmeyer flask.
4. Bring to room temperature.
5. Add 14 mL of 95% ethanol to the 200 mL of degassed beer and mix thoroughly.
6. Let stand for 20 minutes.
7. Obtain Hach cuvettes and fill with the beer ethanol mixture past the white line.
8. Take initial turbidity reading using the Hach portable 2100Q or benchtop TL2310/TL2360 ISO Turbidimeter.
   a. The result of this reading is the permanent haze.
9. Prepare an ice water bath with salt added and allow to stand until a minimum temperature of -5°C has been reached.
10. Chill samples for 1 hour in ice bath in a refrigerated environment.
11. Taking chilled sample reading:
    a. Remove sample from the ice bath
    b. Invert 1 time
    c. Quickly wipe down with paper towel
    d. Once dry, wipe with a Kimwipe to remove finger prints, lint from paper towel, condensation and smudges from the cuvette
    e. Condensation can be an interference so it is important to be in a dry/AC lab environment not on floor
    f. Properly oiled cells also help with condensation
12. Place sample in the turbidimeter and take turbidity reading
13. Take turbidity readings as quick as possible
    a. This measurement is the total haze reading

Calculating Chill Haze

Chill Haze = Total Haze – Permanent Haze

	1 EBC	1 NTU/FNU	1 ASBC
EBC	1	0.25	0.014
NTU/FNU	4	1	0.057
ASBC	70	17.5	1

Key
EBC: European Brewing Convention
ASBC: American Society of Brewing Chemists
NTU/FNU: Formazine Nephelometric Unit

Beer Samples

Beer Sample	Total Haze	Permanent Haze	Chill Haze
Pilsner	13.5 NTU	5.48 NTU	8.02 NTU
Amber Ale	59.3 NTU	2.55 NTU	56.8 NTU
Porter	84.1 NTU	8.04 NTU	76.1 NTU
Stout	31.9 NTU	14.1 NTU	17.8 NTU

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