

# SmartNotes

## QA

As breweries continue to grow, the importance of the quality of their beer becomes increasingly more significant, and basic microbiological testing is no longer enough to guarantee adequate consistency. Larger breweries that already test for beer quality are always looking for ways to simplify their testing efforts by utilizing different technology to limit the time and expense of quality testing. UV-Visible spectrophotometers are a perfect solution to help breweries meet their quality standards by offering quick, simple, and affordable testing as well as the versatility to utilize a large variety of methods compared to more limited instrumentation like a colorimeter.

### Beer bitterness units

Bitterness is one of the most fundamental characteristics of beer and a chief component in its flavor quality. The bitterness of beer is imparted from the use of hops primarily through the iso- $\alpha$ -acids extracted out of the hop cones during brewing. The overall bitterness of beer is measured in International Bitterness Units (IBU or BU). The final BU of beer is a result of both the amount and type of hops used during the brewing process as well as when the hops are added. In order to maintain consistency in quality, bitterness needs to be tightly monitored and controlled.

**Q**uestion:  
How do I measure beer bitterness using UV-Visible spectrophotometry?

**A**nswer:

The overall bitterness of beer can be determined by extracting an acidified beer solution into isooctane followed by measuring the absorbance at 275 nm. The absorbance is then multiplied by 50 to obtain the bitterness in BU.

### Materials needed

Thermo Scientific™ GENESYS™ UV-Visible Spectrophotometer with BeerCraft™ Software, chilled beer, isooctane, hydrochloric acid, octanol, mechanical shaker, centrifuge, centrifuge tubes, pipettes, and 10 mm cuvettes.

General IBU Guide	
Double or imperial IPA	80-100 IBU
Barleywine	70-100 IBU
India pale ale (IPA)	60-80 IBU
Stout	30-50 IBU
English bitter	30-40 IBU
Porter	20-40 IBU
Scottish ale	10-20 IBU
American light lager	8-12 IBU

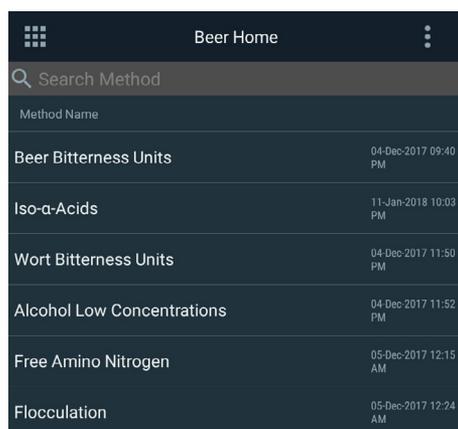
## Procedure

1. Add 10 mL of beer to a 50 mL centrifuge tube followed by 1 mL of 3M HCl, 20 mL of isooctane and 50 µL octanol.
2. Cap the centrifuge tube and shake the sample vigorously with a mechanical shaker for 15 minutes to mix the layers.
3. Allow 5–10 minutes for the organic and aqueous layers to separate. Centrifuge the sample if needed to achieve better separation.
4. Select the Beer Bitterness Units method on your GENESYS UV-Vis Spectrophotometer.
5. Prepare a solution of 20 mL isooctane with one drop of octanol and transfer a portion of this mixture into a cuvette to blank the instrument.
6. A portion of the upper organic layer was transferred from the centrifuge tube to a cuvette and measured to determine its bitterness in BU.



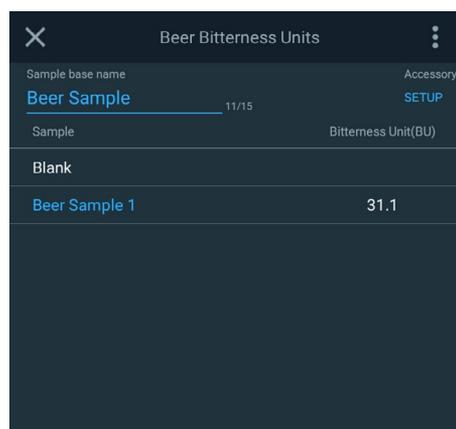
Thermo Scientific™ GENESYS™ 50  
UV-Vis Spectrophotometer

## Easily measure beer bitterness:



1

Open the GENESYS BeerCraft Software and select Beer Bitterness Units



2

Blank the instrument and measure the beer sample to determine its bitterness in BU

## Results

The calculations determined the bitterness of this beer sample was 31.1 BU. This is a typical bitterness measurement for a number of beer styles including pilsners, porters, and stouts.

## References

1. *ASBC Methods of Analysis, online. Beer 23. Bitterness Units Approved 1968, rev. 2018. American Society of Brewing Chemists, St. Paul, MN, U.S.A: 10.1094/ASBCMOA-Beer-23*

## Related chemicals ordering information

Description	CAS number
Isooctane <sup>1</sup>	540-84-1
Hydrochloric Acid	7647-01-0
Octanol <sup>2</sup>	111-87-5

1. Spectrophotometric grade or equivalent.
2. Reagent grade or redistilled equivalent.



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