Nephelometric titration of macromolecular beer complexes using turbidimeter

Sensitive proteins test using Turbidimeter model TurbiLab

(Analytica EBC - method number 9.40 - "Sensitive proteins in Beer by Nephelometry")

Principle:

During the storage of beer their tannoids condense into true tannins. They are then capable of binding themselves with certain proteins to give associations of low solubility. Such a process corresponds to the first step towards the formation of permanent hazes. It proceeds at a very low speed, even at 40°C or 60°C, for strongly stabilized beers.

To simulate the spontaneous increase of the true tannin concentration a solution of tannic acid is injected into the beer. The substances which are protein like in nature and with the strongest affinity with the tannin (known as "sensitive proteins") complex with tannic acid to form an insoluble complex giving rise to haze.

Analytica EBC - method number 9.40 - "Sensitive proteins in Beer by Nephelometry" - The amount of precipitated "sensitive proteins" is measured as an increase in the haze of the sample measured at defined time 40minutes after the tannic acid addition to the final concentration 10mg/l of beer sample. Sensitive proteins are expressed in EBC haze units.

Field of application

The method can be used, in conjunction with an estimation of the tannoid content of beer, to monitor the effectiveness of beer stabilization treatment and results gives an indication of the probable shelf life of the beer.

Apparatus:

Turbidimeter , PC with controlling software MZN Control
pipette (for 6 ml volume)

Reagents:

Tannic acid water solution: 0.2g/l

Procedure:

Connect the turbidimeter to your PC, connect the pump to power supply and to PC.
Switch all instruments on and start the software MZN-Control on PC. Select the type of measurement in the program: *Titration – Measurement – Sensitive proteins* and check (or fill in) the table for individual parameters of measurement:

Sample container: cuvette
Number of measurements: 140
Measuring interval: 00:00:20;
Starting dose: 0;
Dosage: 3.1 ml/hour; (according to pump calibration) Sample
volume: 6 ml

Infuse the syringe with tannic acid solution, connect to the hose of dosing assembly, gently press the piston to eject solution into the whole hose. Prepare the dosing pump according to manual (differs for different type of dosing pump). Place the dosing assembly tip to the separate test tube for the drain.
Pipette 6 ml of degassed beer into the measuring test tube, put the appropriate magnetic bar in, insert the test tube into the turbidimeter measuring chamber and let approx. 10 minutes to mix and stabilize temperature.
Gently wipe the dosing assembly tip and place it into the test tube containing the sample. Start the measurement procedure from the PC program. When the measuring process starts the sample haze value is automatically measured in dependence on time at the simultaneous dosing of Tannic acid solution into the sample. Tannic acid solution dosage stops at the concentration 10mg/1litre of sample. Haze measurement continues. The curve of haze change in dependence on time is drawn on the display. (Measurement can be stopped at any time from by the PC- kexboard.)

Result evaluation:

Automatic evaluation:

Switch *"Automatic results"* on (window - *"Measurement – Sensitive proteins").* Test result will be automatically recalculated and stored in the data file just after the measurement ends.

Automatic evalution (viewing mode)

Start the viewing mode in MZN-Control software, open required file which includes measured data (the measured data are drawn on display). Select *"Functions – Sensitive proteins result"* item. Enter the time value for sensitive proteins haze evaluation (40 minutes predefined) and press OK. The resulting value is displayed and can be stored directly into the file results

Manual evaluation:

Start the viewing mode in MZN-Control software, open required file which includes measured data (the measured data are drawn on display). Select *scan,* move cursor to the first measurement and write the measured haze down. Move cursor to the position, measured at 40 minutes after the start, and write the measured haze down. The resulting value is the haze difference see figure. (The resulting value can be stored directly into the file using *"results"* item)

Sensitive proteins result is expressed in EBC units to 2 place of decimals. Sensitive proteins result example:

Sensitive proteins = 35.09 EBC