



SIMULTANEOUS DETERMINATION OF BITTER ISO- α -ACIDS AND α - AND β -HOP ACIDS IN BEER

INTRODUCTION

It is important to quantify α - and β -hop acids (humulons and lupulons) as well as bitter iso- α -acids (isohumulons) on the all stages of beer production. Hop acids are the biochemical markers of a certain hop type. Bitter iso- α -acids stabilize the beer foam, suppress the growth of undesirable microorganisms and give the beer its bitter taste.

MEASUREMENT METHOD

The method has two stages – sample preparation and analysis. The first stage is based on the sample degassing, extraction of acids into iso-octane, evaporation and subsequent dissolving of the residual into water / methanol mixture. Analysis is based on the differential migration of ionic forms of the analysed compounds in the fused silica capillaries under the influence of the applied electric field. Sodium dodecyl sulphate is added to the electrolyte to provide the so-called pseudostationary phase which leads to a better resolution. Detection is done at 215 nm. To increase selectivity it is possible to switch the wavelength to 315 nm during the run.

MEASUREMENT RANGE

Determination of the total hop and bitter acids concentration is done by normalization for the each acid group. In general, the measurement range for **bitter acids** is **5–200 mg/L**, for **hop acids** **1–100 mg/L**.

EQUIPMENT AND REAGENTS

The “CAPEL[®]-105/105M” capillary electrophoresis system is used in measurements.

Data acquisition, collection, processing and output are performed using a personal computer running under “WINDOWS[®] 2000/XP” operating system with installed dedicated software package for acquisition and processing of chromatography data.

All reagents must be of analytical grade or higher.

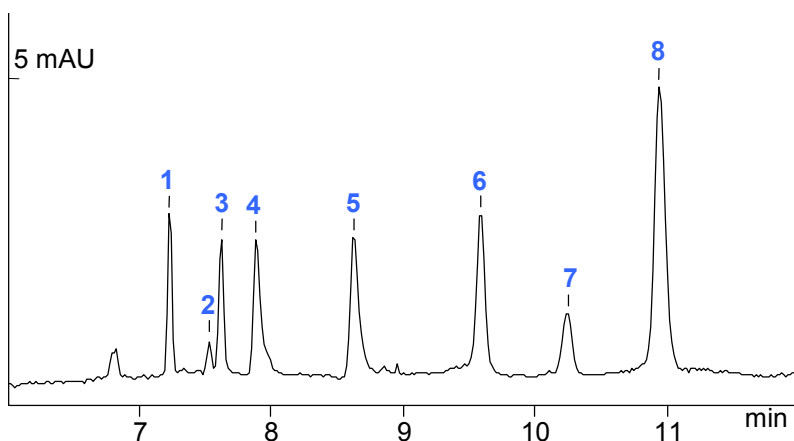
EXAMPLES OF REAL ANALYSES

Buffer: borate, with SDS, pH 9.18
Capillary: L_{eff}/ L_{tot} 65/75 cm, ID 50 μ m
Injection: 300 mbar x sec
Voltage: + 25 kV
Temperature: + 30 °C
Detection: 215 nm

Sample: ICS-12 standard (iso- α -acids) and ICE standard (α - and β -acids)

1–3 – iso- α -acids (total concentration 67 mg/L)

4–8 – α - and β -acids (total concentration 89 mg/L)



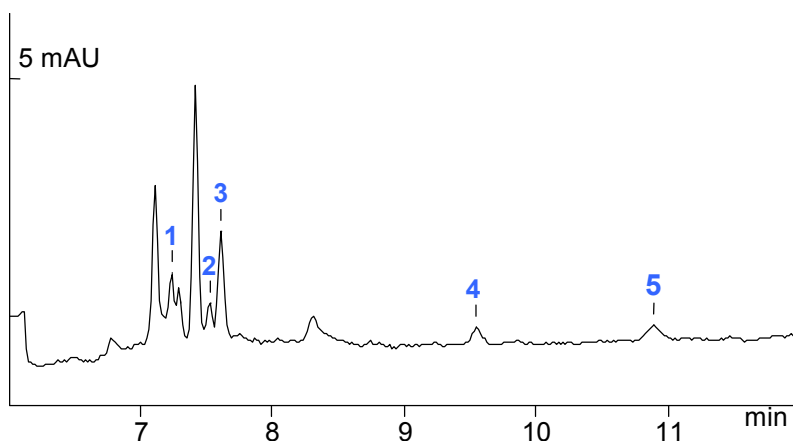


Sample: light beer, initial volume 10 mL

Measurement results:

1–3 – iso- α -acids (total concentration 36.7 mg/L)

4 and 5 – α - and β -acids (total concentration 4.3 mg/L)



Other beer components, which can be determined by capillary electrophoresis method are following:

- Cations and anions in water for brewing processes;
- Organic acids;
- Vitamins (B complex, ascorbic acid);
- Amino acids;
- Amines (histamine, volatile alkyl amines);
- Preservatives and coloring agents in finished products.

The content of this application note is subject to change without notice.