

BEER QUALITY

Brewing Quality Analysis

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Technologies

The quality control group of the Carlsberg Research Laboratory performs analyses of water, barley, hop products, wort and beer in order to secure the highest quality obtainable for the final products of the Carlsberg Breweries and the affiliated breweries all over the world.

Analyses are performed to secure that unwanted trace compounds e.g. pesticides are not present in the raw materials, furthermore, that the materials used during the malting and brewing processes have a composition which will not cause problems / is optimal with respect to the malting and brewing processes. In order to fulfil these objectives the following instruments are employed:

- High pressure liquid chromatograph
- Ion exchange chromatograph (Dionex instruments)
- Gas chromatograph with FID detector
- Gas chromatograph with ECD detector
- Gas chromatograph with sulfur chemiluminescence detector
- Gas chromatograph with MS detector
- Atomic absorption spectrophotometer (flame/graphite furnace)
- Amino acid analyzer

Projects

Many of the analytical methods used to measure the analytes listed below have been developed at the Carlsberg Research Laboratory. Currently, methods for measuring hop oil components in hop products and in beer are being developed.

Results

The analytes measured routinely include:

<i>Barley</i>	18 pesticides.
<i>Water</i>	Anions (fluoride, chloride, nitrite, nitrate, phosphate, sulfate), ammonia, Cations (Na, K, Ca, Mg, Zn, Cu, Fe, Mn, Al) Permanganate number (COD) Temporary hardness (carbonate + bicarbonate) Trihalomethanes.
<i>Hop products</i>	α -acids and β -acids, iso- α -acids, reduced iso- α -acids, Hop oil content. Hop storage index (HSI).
<i>Wort analysis</i>	Fermentable carbohydrates, 12 carbohydrates (DP1-DP7) Ca, Mg and Zn content
<i>Beer analysis</i>	Aroma profile (13 esters and higher alcohols) Metal ions (Al, Ca, Cu, Fe) Anions (oxalate, chloride, sulfate) Iso- α -acids and reduced iso- α -acids (Rho, Tetra, Hexa) Amino acid analysis

The analysis methods mentioned above are mainly applied in connection with quality control, troubleshooting and the solution of problems in the breweries, but also in connection with research projects within Carlsberg Research Center.

