



Steinecker Hopnomic

More bitterness with less hops



Green gold - hops give every beer its soul

In the Purity Law of 1516, hops were listed as one of the three essential ingredients for beer, along with water and malt; yeast was not yet known at that time. Hops essentially impart bitterness and aroma to beer, although their sheer countless ingredients fulfil many other functions. However, the yield of these valuable ingredients is very low, which is why high losses of the raw material used had to be accepted until now. Especially in the case of bitter substances, only about one third of the alpha acids contained in hops make it into the finished beer. Hopnomic now offers you a way to minimise these losses.

At a glance

- Increased solubility and isomerization of alpha acids
- Reduced raw material requirement
- No change in the taste profile

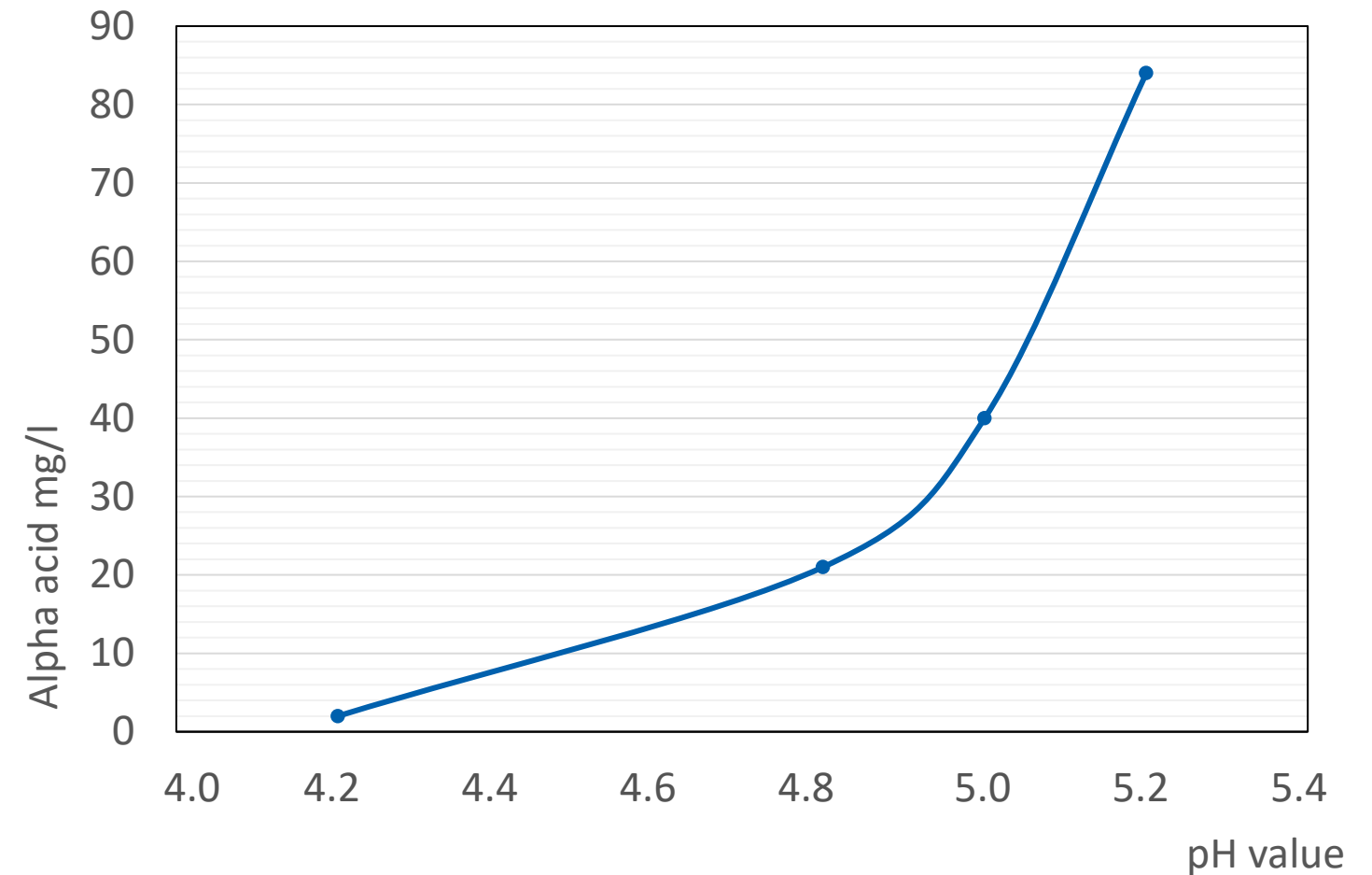




Influences on the rate of alpha acid isomerization

- Alpha acids are isomerized during wort boiling to iso-alpha acids, which give the beer its bitterness.
- A prerequisite for isomerization is to dissolve the alpha acid from the hops, because only then can it also be transformed into iso-alpha acid.
- The solubility of the alpha acid is dependent on the pH-value of the wort, which cannot be adjusted without affecting other quality parameters.
- Therefore, with the Hopnomic, hops are added to specially prepared, alkaline brewing liquor in order to be able to realise ideal pH values.

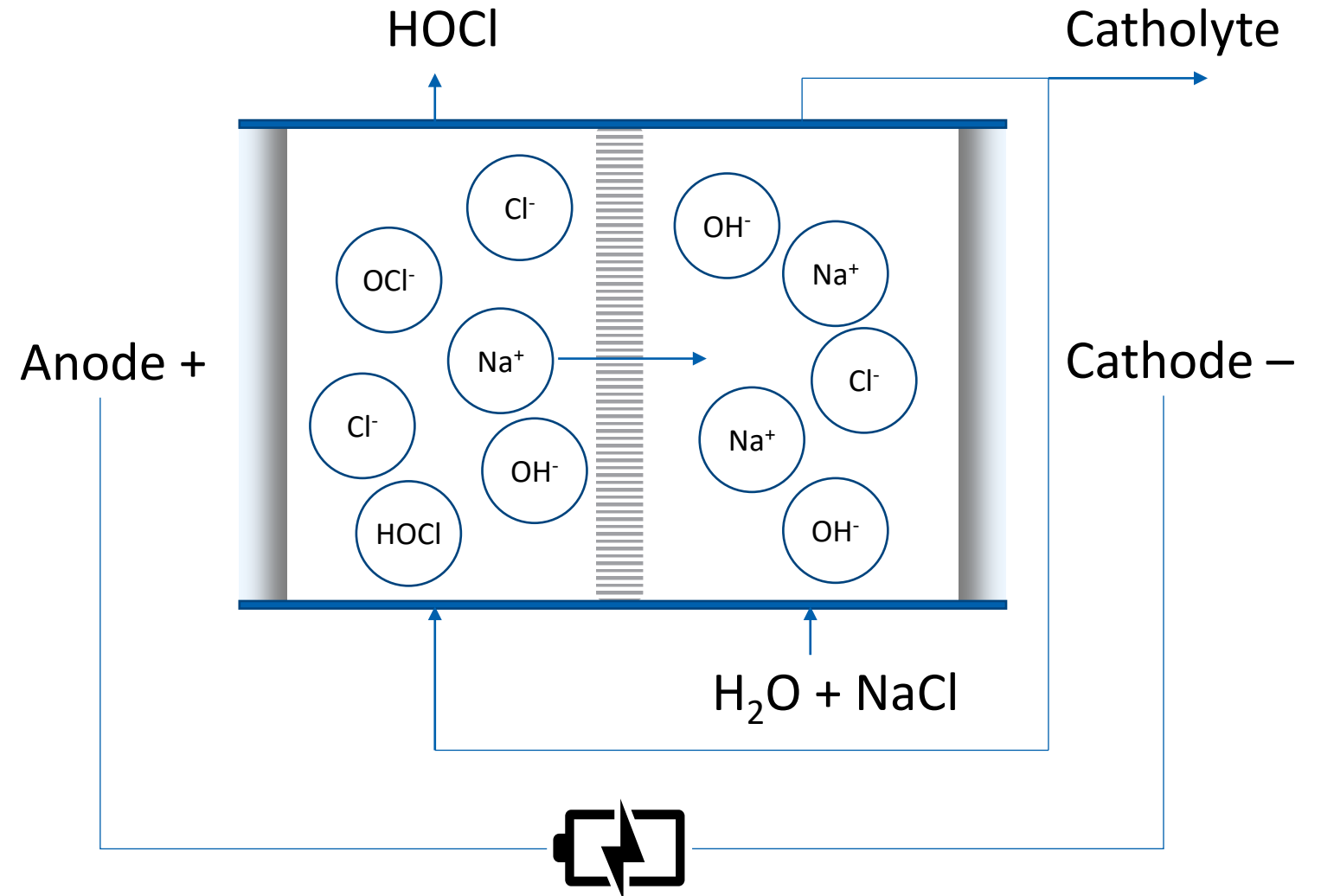
Solubility diagram





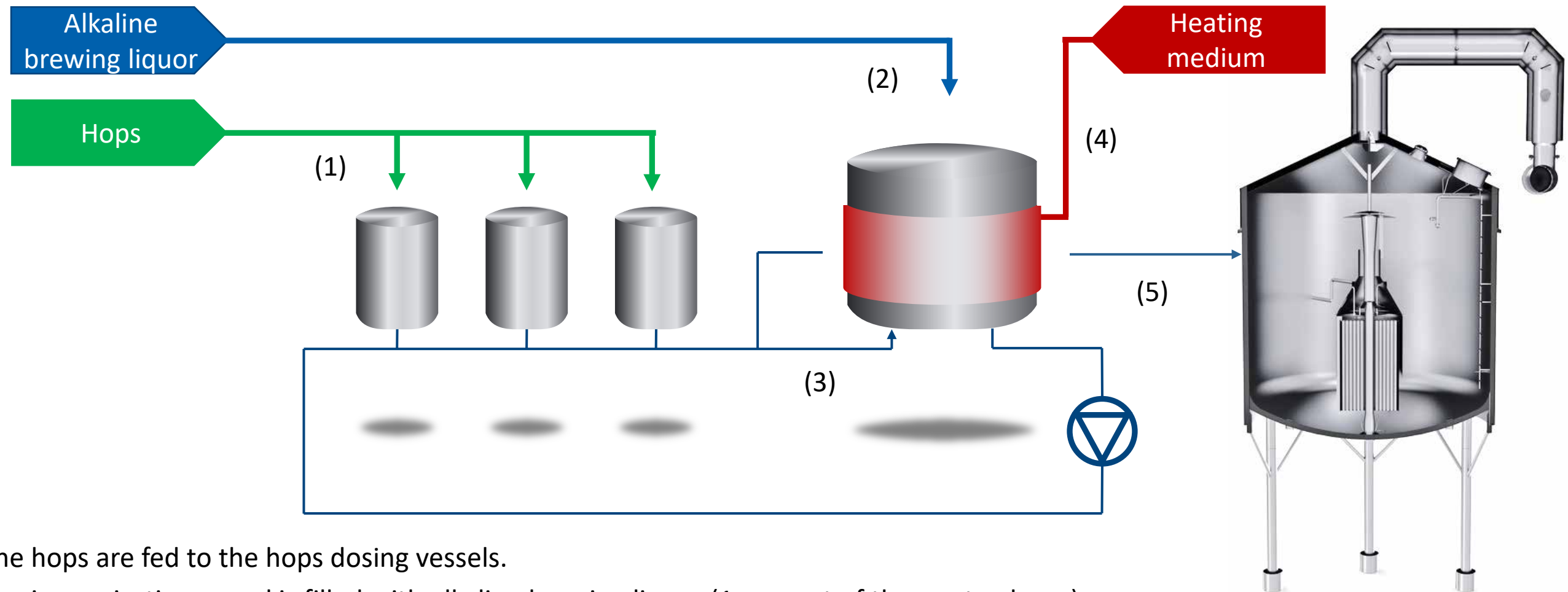
Membrane cell electrolysis for the production of a catholyte

- Alkaline brewing liquor is produced by diaphragm electrolysis from normal brewing liquor to which salt has been added.
- By applying an electrical voltage in a membrane cell, the ions contained in the water are separated.
- A hypochlorous acid is produced in the anode compartment, which can be used for water treatment and disinfection.
- As a further product, catholyte is produced in excess. This is used in Hopnomic to dissolve and isomerize the alpha acids.





Hopnomic at a glance



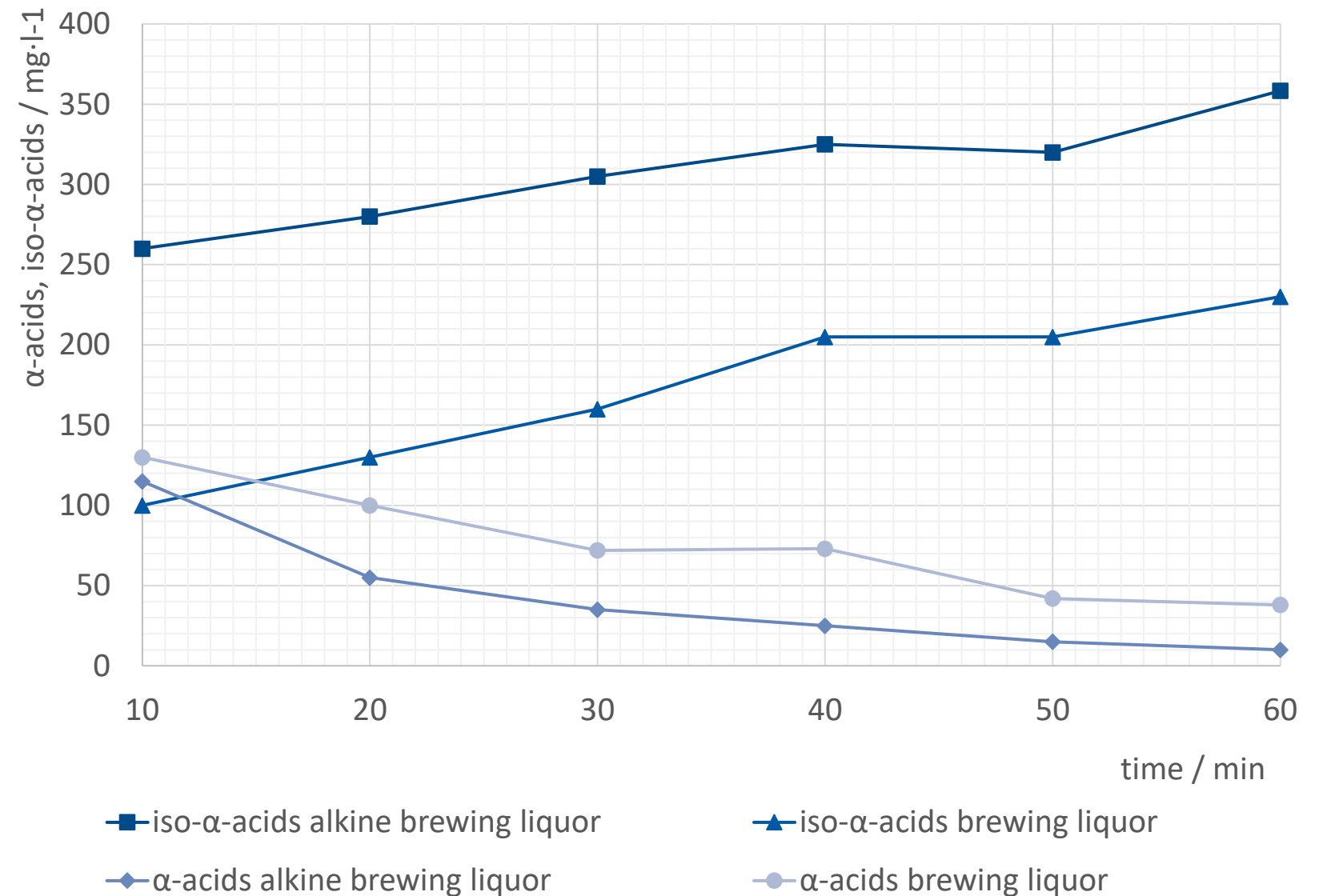
- (1) The hops are fed to the hops dosing vessels.
- (2) The isomerization vessel is filled with alkaline brewing liquor (1 percent of the wort volume).
- (3) The hops added from the hops dosing vessels are circulated through the isomerization vessel.
- (4) For a better effect, the process is heated.
- (5) After about 30 minutes, the hop suspension is dosed into the wort for final isomerization.



Time-dependent distribution of bitter substances

In the laboratory, the potential improvement of isomerization by using alkaline brewing liquor was analysed: For this purpose, hops were treated in both alkaline and normal brewing liquor at 98.5 °C for 60 minutes.

The result: The concentration of Iso-alpha acids in alkaline brewing liquor was significantly higher than in normal brewing liquor.





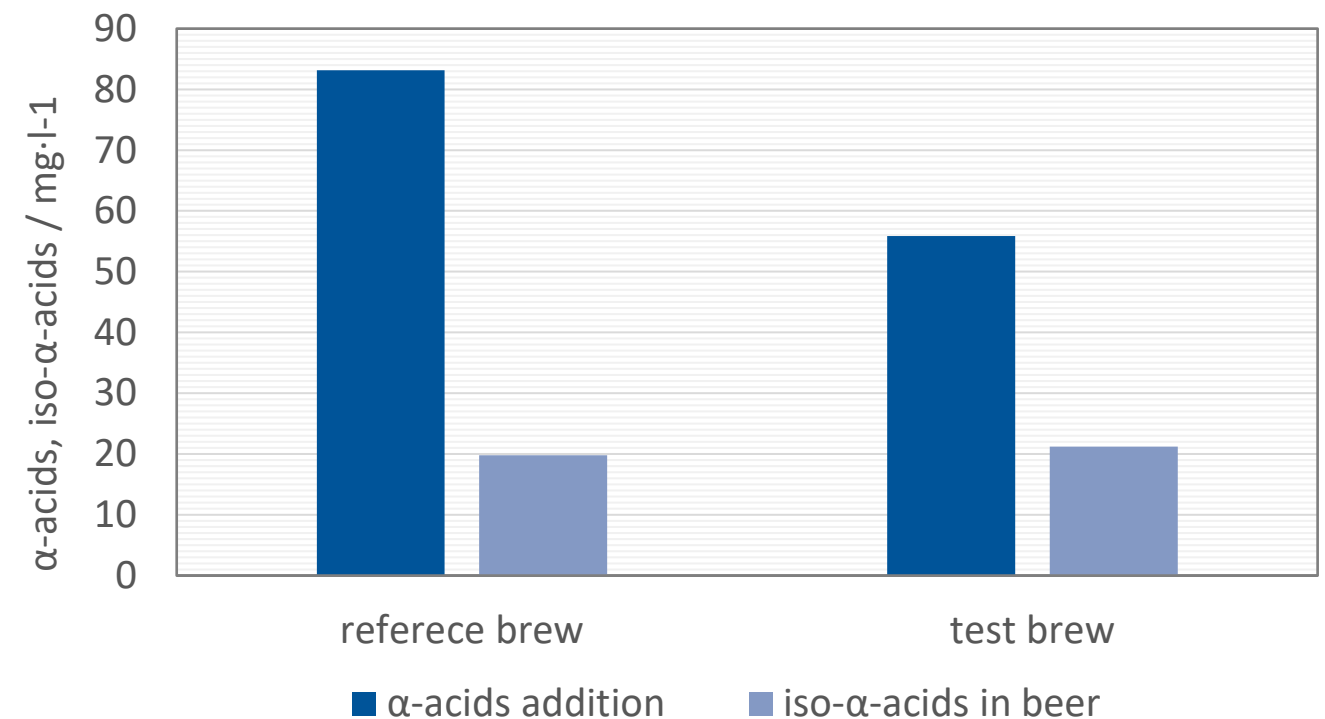
Test brews in the Steinecker Brew Center

Two light beers of five hectolitres each were brewed from one malt batch with the aim of achieving 20 bitterness units. The increased isomerization known from the laboratory test with alkaline brewing liquor was compensated by a reduced hops dosing.

	Reference brew	Test brew
Original extract	12.5 % [m/m]	12.6 % [m/m]
Hops dosing	744 g	500 g
Hops boiling time	60 min. in wort	30 min. in alkaline water 30 min. in the wort
Evaporation	4.5 % [v/v]	4.5 % [v/v]
pH value full wort kettle	5.5	5.6
pH value 15 min. boiling time	5.6	5.6
pH value 30 min. boiling time	5.5	5.5
pH value 45 min. boiling time	5.5	5.5
pH value 60 min. boiling time	5.5	5.6
pH value of cast wort	5.4	5.5
Iso- α -acids	19.8 mg/l	21.2 mg/l
EBC bitterness units	22 bitterness units	20 bitterness units
cis-Isolumulone	13.4 mg/l	16.4 mg/l
trans-Isolumulone	6.4 mg/l	4.8 mg/l
cis/trans ratio	2.1	3.4

The result:

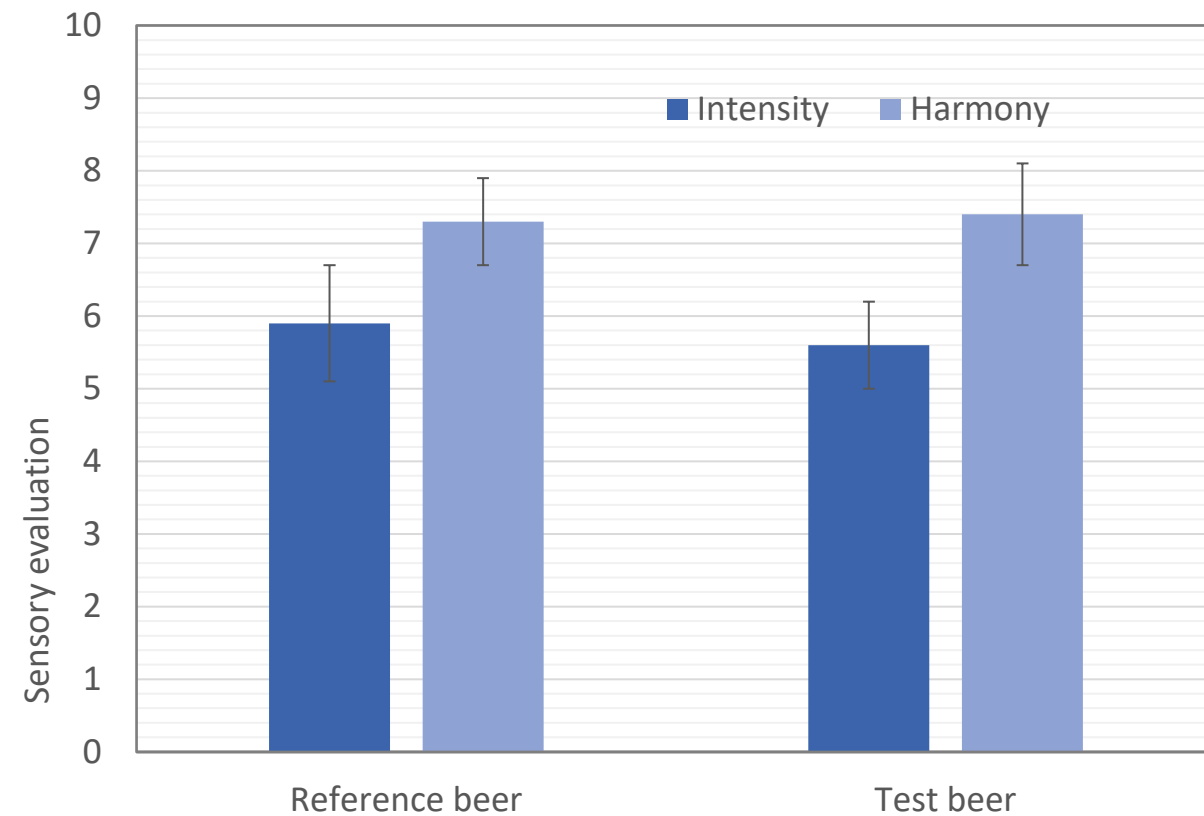
- Despite the hop addition being reduced by 30 per cent, the same amount of Iso-alpha acids could be achieved in the beer.
- The pH value of the wort was not changed by the alkaline brewing liquor.



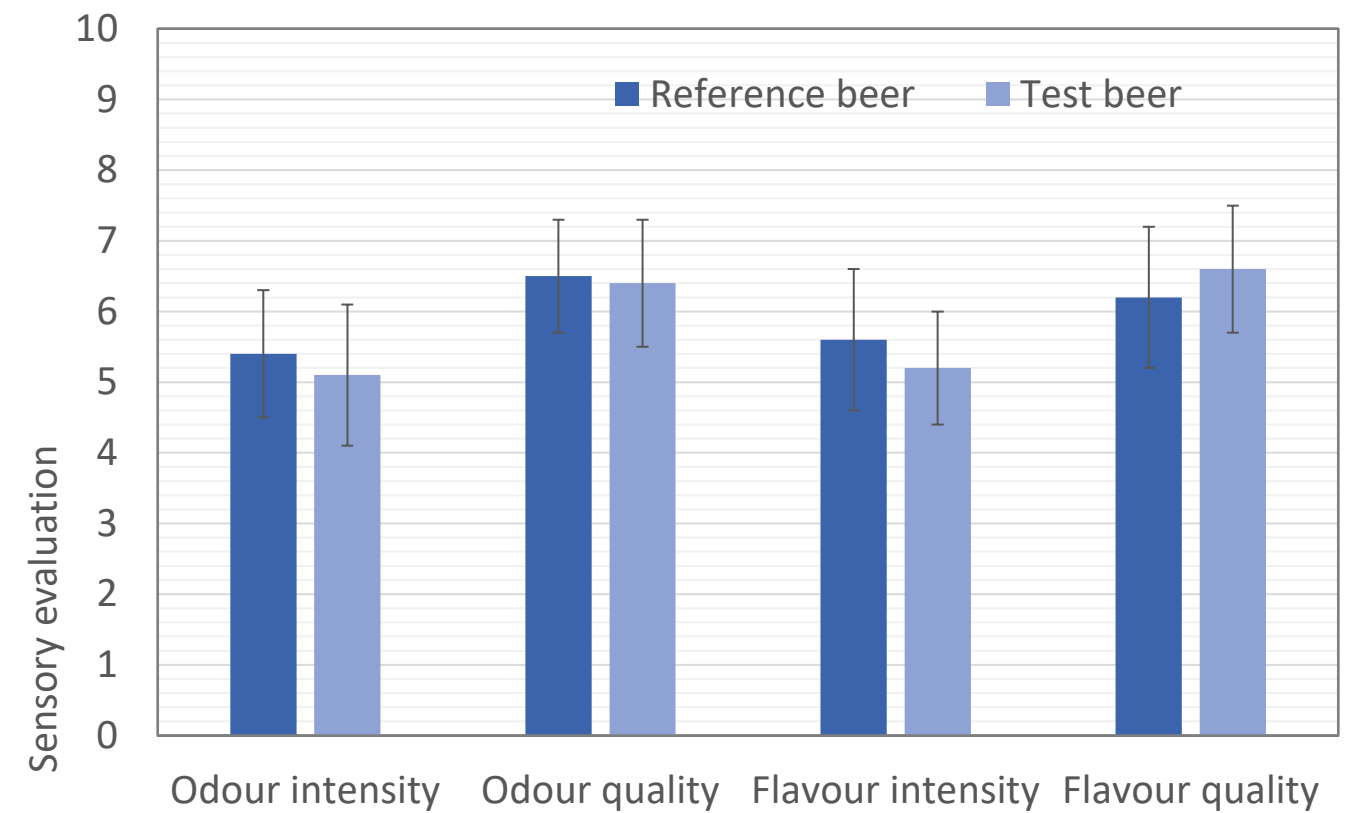


Sensory evaluation of bitterness and hop aroma

- Both the intensity of the bitterness and the harmony were rated the same in both beers. No significant difference was found.



- The hop aroma was also found to be the same in both quality and intensity of odour and flavour.
- In a ranking test, none of the beers was preferred.

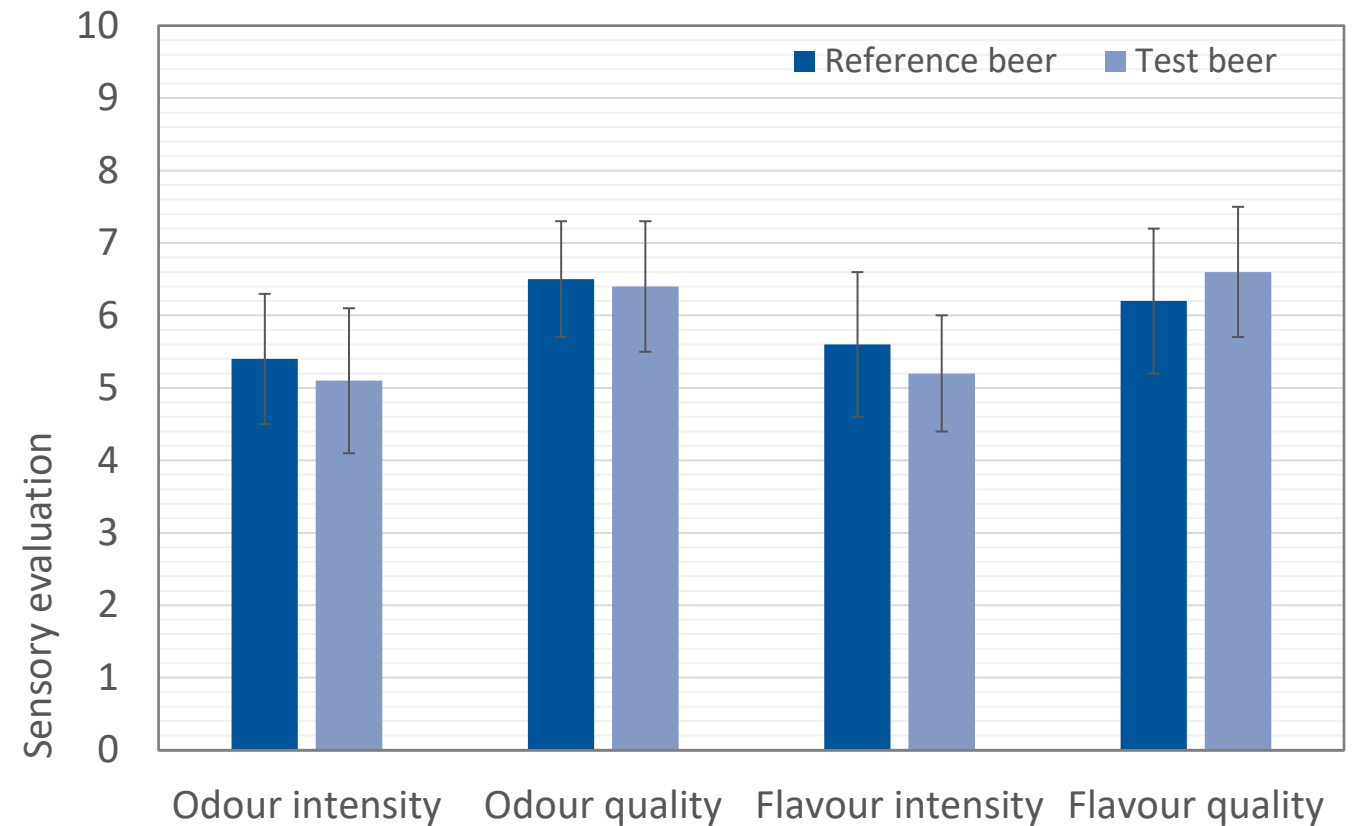
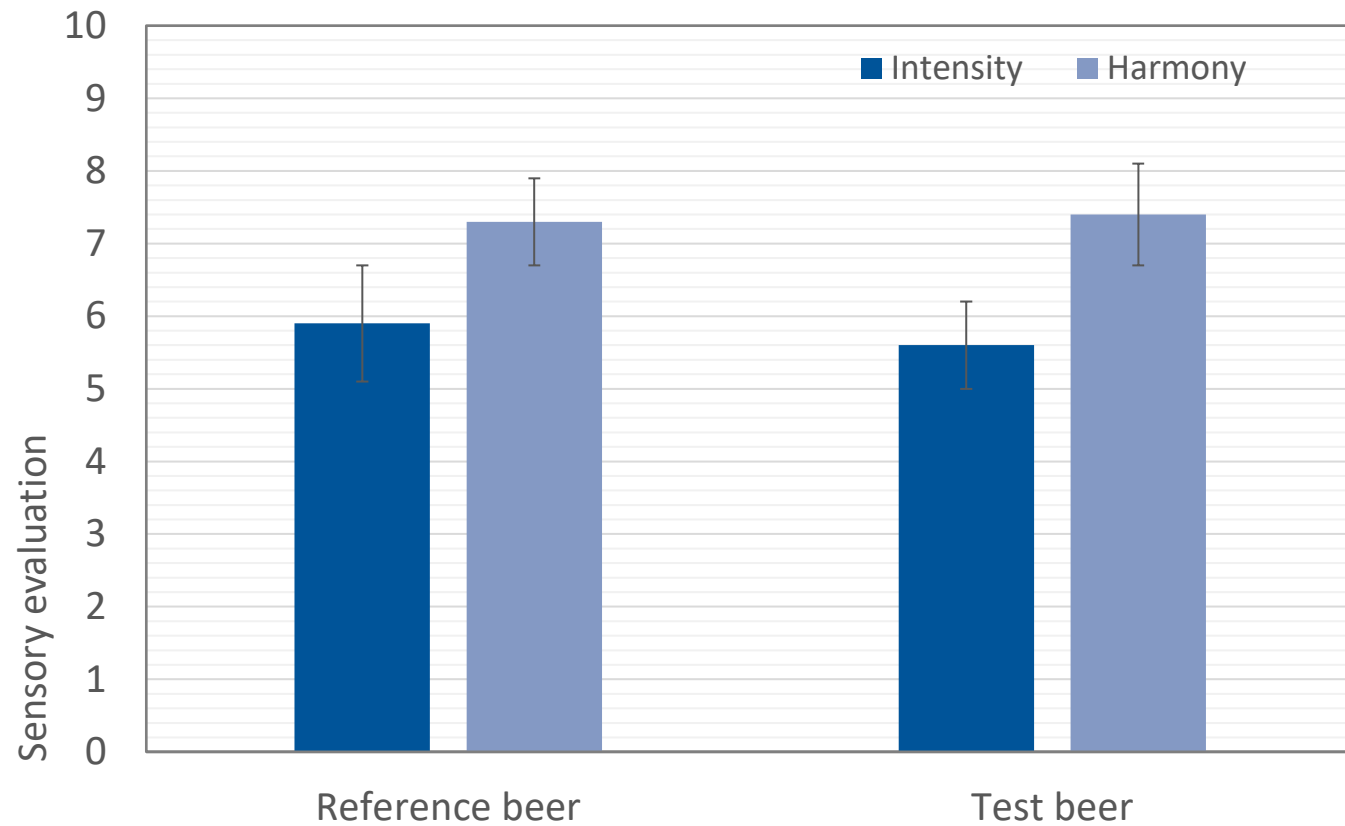




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Benefits to you

Increased yield

Dissolving and isomerizing the hops in alkaline brewing liquor enables up to 30 percent less hops to be added, which reduces operating costs and minimises wastage of raw materials.

Reduced wort losses

The likewise reduced hot break quantity reduces wort losses during hot break separation in the whirlpool.

Consistent quality

Despite the reduced hops dosing, the quality of your beers remains unchanged, both in terms of intensity and quality of bitterness.

Hopnomic	
Annual beer production	500,000 hl
Alpha-acid dosing	8 g/hl
Annual alpha-acid quantity	4,000 kg
Possible saving	30 %
Alpha-acid costs	50 €/kg
Annual saving	60,000 €



Solutions beyond tomorrow

