The quality of betaine hydrochloride products

The inclusion of betaine in animal feed is of high interest. This nutrient is not only the most efficient methyl donor in the liver, it is also a protective osmoregulator. Therefore, especially in situations such as heat stress, betaine protects the animal and can improve the zootechnical performance.

One of the most interesting sources of betaine for animal feed is synthetic betaine hydrochloride (betaine HCl). When choosing the source of betaine and comparing different products, it is always important to consider quality parameters.

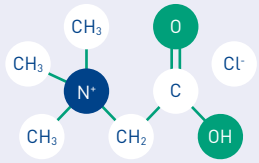
CHECKING BETAINE CONCENTRATION – THIS CAN BE TRICKY!

Analysis of betaine and betaine HCl concentrations, either by (perchloric acid-) titration or by HPLC-based methods, are difficult procedures. To receive reliable results, it is necessary to cooperate with experienced laboratories, familiar with betaine analyses according to established standards. Not in every region such laboratories are available to do a quality control of betaine HCl products.

ALTERNATIVE QUALITY ANALYSES

Based on the molecular theory of betaine HCl (see figure), some alternative analysis can be used as a first indication of the product quality. The following parameters are more common and can more easily be analyzed in a reliable way by external or in house laboratories. If one of the obtained results deviates extensively from expected values, questions regarding the product quality arise and it is recommended to investigate the product more thoroughly.

Molecular structure of betaine HCl



Betaine hydrochloride ($C_5H_{12}ClNO_2$)
Molecular weight = 153.61 g/mol

Betaine hydrochloride contains:
1 Nitrogen atom (N = 14.01 g/mol)
1 Chloride ion (Cl^- = 35.45 g/mol)

→ **On weight basis this gives:**
9.12% N (14.01/153.61)
57.00% Crude protein
(CP = 6.25xN)
23.08% Cl^- (35.45/153.61)

- **Crude protein (CP) or nitrogen (N) concentration**: With the Kjeldahl method, the total N content of a product is determined and when multiplied by 6.25, CP level is obtained. In theory (see figure), betaine HCl contains 9.12% N or 57.00% CP. Accordingly, products with concentration of 98% or 95% betaine HCl, should contain 8.94% or 8.66% N, and 55.86% or 54.15% CP, respectively.
- **Chloride (Cl^-) concentration**: Based on its molecular structure and weight, betaine HCl contains 23.08% chloride. Accordingly, products with concentration of 98% or 95% betaine HCl should contain 22.62% or 21.93% Cl^-, respectively.
- **Moisture content**: High moisture in betaine HCl products is indicative for hygroscopicity and inferior product quality. Loss on drying should be ⩽ 2%.
- **Crude ash level**: By heating in a muffle-furnace (4h at 550°C) the crude ash level of the product can be determined. Betaine HCl should have a negligible ash level (⩽ 1%) and, therefore, crude ash of a betaine HCl product should correspond to the expected level of anti-caking or free flowing material.
- **pH**: Typically, pH of betaine HCl products should be 0.8-1.2. Measuring can be done after solubilization in distillated water.

EXCENTIAL BETA-KEY: A TOP-QUALITY BETAINE HCL PRODUCT

Excential Beta-Key is a non-hygroscopic betaine HCl (see head picture) and globally recognized for its premium product quality. The product is assured by GMP+, FAMI-QS and ISO 9001 certification, which implement HACCP principles. Moreover, Orffa subjects its products to a strict internal QA Monitoring System that outperforms the European legal requirements. This monitoring is performed on random Excential Beta-Key samples obtained at the warehouse and includes active content, and the absence of undesired substances (e.g., dioxins, heavy metals, TMA...). All analyses are performed by independent, external qualitative laboratories. Purity and safety are important concerns. With Excential Beta-key, customers are guaranteed a high-quality and very secure product.

For more information please visit our website (www.orffa.com) and contact one of our specialists.