relana®

relana® Method Ring Test 02/2015
“Aminoalcohols in Apples and Lemons”

Summary

The entire report is made available to participants of the test only.

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Aminoalcohols are chemical compounds, which contain two functional groups, a hydroxyl (-OH) as well as an amino (-NH2) group. Aminoalcohols are used as emulsifiers and ingredients in wax formulations during post harvest treatment of food of plant origin, mainly apples and citrus fruits.

Aminoalcohols are not permitted as food additives according to regulation (EC) 1333/2008 or carriers in waxes according to Annex V of Directive No 92/2/EC in the EU.

Up to now, no official analytical method has been published for the quantification the eight aminoalcohols mentioned above in food. Only morpholine, diethanolamine and triethanolamine are included in the QuPPe method module M4.2 resp. M7 (published by CVUA Stuttgart). As a consequence, the scope of aminoalcohols as well as the applied analytical methods and the reporting limits vary from lab to lab.

The method ring test was designed and organised exclusively for members of the relana® quality circle. It offers the relana® laboratories the opportunity to test their analytical performance with respect to the quantification of aminoalcohols in apples and lemons. Furthermore, the relana® laboratories exchange their knowledge by reporting methodical details and are thus able to identify current shortcomings and to further improve the applied analytical methods.

Nine relana® laboratories across four European countries took part.

Two test materials – apple and lemon - and the corresponding blank materials were offered. The test materials were prepared of organic apples and lemons, which were homogenised, tested for incurred residues and spiked thereafter.

Eight aminoalcohols, which are most relevant in food, were spiked to the test materials at different concentration levels:

- *Morpholine,*
- *Diethanolamine,*
- *Triethanolamine,*
- *2-Amino-2-methyl-1-propanol,*
- *N,N-Diethylethanolamine,*
- *N,N-Dimethylethanolamine,*
- *1-Methoxy-2-propylamine,* and
- *3-Methoxypropylamine*.

In order to adjust the design of the method ring test to the needs of the relana® laboratories, the members of relana® were asked to provide a list of the established aminoalcohols as well as their reporting limits in the run-up to the test.

It was up to the laboratories to quantify the full set of eight analytes per test material or a selection of them. A questionnaire was provided for the reporting of the details related to the applied analytical methods.

The results of the participants were assessed with respect to the *trueness* of the results as well as the *comparability* of the results. The trueness is expressed as the coverage of the spiked level in %. The coverage should be at least between 70 and 120 % of the spiked level. The evaluation of the comparability is based on the z-score model. The z-score should be at least ≤ |2|.

The details related to the analytical methods, which were applied by the different laboratories, were summarised in a report and provided to the participants thereafter.

Results

1) Scope:

- All laboratories reported results of morpholine, diethanolamine and triethanolamine.
- Seven labs quantified 2-amino-2-methyl-2-propanol, N,N-dimethyl- and N,N-diethyl-ethanolamine, and 3-methoxypropylamine.
- Five out of nine laboratories quantified the entire scope of eight aminoalcohols in both matrices.

Lab code	Morpholine	Diethanol-amine	Triethanol-amine	2-Amino-2-methyl-1-propanol	N,N-Diethyl-ethanol-amine	N,N-Dimethyl-ethanol-amine	1-Methoxy-2-propyl-amine	3-Methoxy-propyl-amine
1	yes	yes	yes	**no**	**no**	**no**	**no**	**no**
2	yes	yes	yes	yes	yes	yes	yes	yes
3	yes	yes	yes	yes	yes	yes	yes	yes
4	yes	yes	yes	yes	yes	yes	yes	yes
5	yes	yes	yes	yes	yes	yes	**no**	yes
6	yes	yes	yes	**no**	**no**	**no**	**no**	**no**
7	yes	yes	yes	yes	yes	yes	yes	yes
8	yes	yes	yes	yes	yes	yes	yes	yes
9	yes	yes	yes	yes	yes	yes	**no**	yes

2) Overall performance:

- **Comparability**:
  Four (4) out of nine (9) labs pass the comparability criterion for all eight aminoalcohols and both matrices. Another three labs pass the comparability criterion for 6 out of 8 parameters (matrix apple) resp. 7 out of 8 parameters (matrix lemon).
- **Trueness**:
  Two (2) of out of nine (9) labs pass the trueness criterion for all eight aminoalcohols with respect to the matrix apple, while three (3) labs pass the trueness criterion for all eight aminoalcohols with respect to the matrix lemon.

3) Performance of the labs with respect to the individual aminoalcohols:

Parameter	Matrix	Spiked level [mg/kg]	Assigned value [mg/kg]	No. of results	No. of labs, which pass the compara-bility criterion	No. of labs, which pass the trueness criterion
Morpholine	Apple	0.15	0.153	9	8	7
	Lemon	2.9	2.87	9	6	6
Diethanolamine	Apple	0.060	0.0746	8	8	4
	Lemon	0.52	0.524	9	8	8
Triethanolamine	Apple	0.25	0.250	9	9	8
	Lemon	0.070	0.0657	8	8	6
2-Amino-2-methyl-1-propanol	Apple	0.21	0.214	7	7	6
	Lemon	0.43	0.413	7	7	7
N,N-Diethyl-ethanolamine	Apple	0.12	0.122	7	7	6
	Lemon	0.32	0.304	7	7	7
N,N-Dimethyl-ethanolamine	Apple	0.65	0.693	7	6	6
	Lemon	0.22	0.241	7	7	7
1-Methoxy-2-propylamine	Apple	0.79	0.813	5	4	4
	Lemon	0.25	0.270	5	5	4
3-Methoxy-propylamine	Apple	0.35	0.423	7	5	3
	Lemon	0.16	0.186	7	7	6