

Determination of the Total Volatile Basic Nitrogen (TVBN) in Fish according to Conway and Byrne method

Reference: Conway and Byrne method (1933)

Tested with VELP Scientifica UDK 159 Automatic Kjeldahl Distillation&Titration System (Code F30200150)



Introduction

Fish is one of the most easily perishable food because of its peculiar chemical composition; therefore, it's important to evaluate its freshness, both for commercial aspects, and from food safety and hygiene point of view. The protein degradative processes, occurring during fish perishing, produce an increase of typical substances, such as ammonia and volatile nitrogen compounds, and the concentrations of which are index of the deterioration status.

The TVBN (Total Volatile Basic Nitrogen) is a method of analysis that quantifies the presence of nitrogenous compounds (ammonia and dimethyl and trimethyl amine) in fish from the sea or from river, revealing the degree of freshness.

TVBN Determination in fresh and frozen fish

One of the routine methods which may be used to check the TVBN is the "microdiffusion method" described by Conway and Byrne (1933).

The sample is alkalinized by magnesium oxide (MgO). Then the TVBN is determined by steam distillation and titration: the Automatic Distillation and Titration System UDK 159 is suitable for this kind of application.

Sample

Standard FAPAS	Canned Fish
Ref. Number	T25100QC
Quantity	150 g
Analyte	Total Volatile Basic Nitrogen
Units	mg/100 g
Assigned value	25,03
Satisfactory range	20,03 - 30,03

Sample Preparation

In this specific case, the standard doesn't need to be homogenized.

Weight 10 g of sample and place it in a test tube along with 1 Antifoam VS (Code A00000283) and 2 g of MgO.

Distillation and Titration

Condition the UDK 159 unit by performing the Automatic Check up in Menu-System and a Wash down.

The following parameters must be set:

- H₂O (dilution water): 50 ml
- NaOH (32 %): none
- H₃BO₃ (4 % with indicators): 30 ml
- H₂SO₄ (0.1N) as titrant solution
- Steam power: 30 %

For collecting 100 ml in 10 min as required from the Conway Method (1933), the steam power 30% must be set.

In order to avoid damaging the distillation unit, it's necessary to NOT use the "removal of distillation residues" function.

Once accepted the blanks average, the samples have been distilled in series.

Position the test tube with the sample into the unit UDK 159 and start the distillation.

Results

The results are calculated in mg of TVBN/100 g.

Sample quantity (g)	H ₂ SO ₄ (ml)	TVBN mg/100 g
10.063	1.494	20.791
10.073	1.477	20.534
10.037	1.454	20.287
10.173	1.475	20.305
10.443	1.512	20.276
9.995	1.442	20.204
10.362	1.504	20.326
10.535	1.525	20.272
9.972	1.455	20.433
10.359	1.498	20.251
Average ± SD%		20.368 ± 0.177
RSD% *		0.9

* RSD% = (Standard Deviation * 100) / Average

For the test with UDK 159, 0.065 ml of H₂SO₄ 0.1 N has been accepted as blank value.

Conclusion

The obtained results are reliable and reproducible in accordance with the expected values, with a low relative standard deviation (RSD < 1%), that means high repeatability.

This makes the UDK 159 suitable for TVBN determination.

The distillation and colorimetric titration system is able to provide precise and reliable results.

Benefits of Conway and Byrne method by using UDK 159 are:

- High level of precision and reproducibility
- High productivity
- Worldwide official method
- Time saving
- Affordable equipment cost
- Moderate running costs
- Partly unsupervised