

N/Protein Determination in Tomato Sauce (Matriciana & Datterini)

according to the Dumas combustion method

Reference: Velp Internal Procedure

Tested with VELP Scientifica NDA 701 Dumas Nitrogen Analyzer (Code F30800070)



Introduction

Tomato sauce refers to any of a very large number of sauces made primarily from tomatoes, usually to be served as part of a dish (rather than as a condiment). Tomato sauces are common for meat and vegetables, but they are perhaps best known as sauces for pasta dishes.

In the tomato sauce the amount of protein is highly variable and closely related to the ingredients.

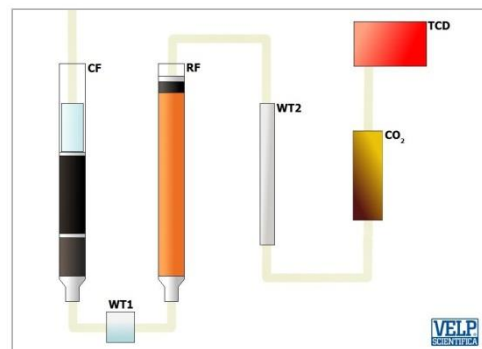
Protein Determination in two different tomato sauces

The Dumas method starts with a combustion furnace (CF) to burn the sample, obtaining elemental compounds.

Water is removed by a first physical trap (WT1 - **DriStep™**), placed after the combustion, and a second chemical one (WT2). Between the two, the elemental substances passed through a reduction furnace (RF).

The auto-regenerative CO₂ absorbers (CO₂) let pass only the elemental nitrogen that is detected by the **LoGas™** innovative Thermal Conductivity Detector (TCD) with no requirement for a reference gas.

The NDA 701 is controlled via PC through the intuitive **DUMASoft™**.



NDA 701 Preliminary Operations (daily)

Follow the operating manual to start the NDA 701 and check that the following parameters are set:

Temperature Combustion reactor(Code A00000158): 1030°C

Temperature Reduction reactor (Code A00000226): 650°C

Flow rate MFC1 He: 190 ml/min

Flow rate MFC2 He: 220 ml/min

Condition the system by testing 2 EDTA standard (Code A00000149) and 3 to 5 empty tin foils (Code A00000153) as Check up. Verify the calibration curve with one or more tests as Standard by testing the same standard used for the curve creation.

Sample Preparation

Homogenize through VELP OV5 (Code R20900010) the tomato sauce sample in an empty and clean beaker.

Put into the tin foil 50-70 mg of Chromosorb (Code A00000148).

Fill the tin foil with around 200 mg of tomato sauce with spatula.

Carefully close the tin foil, obtaining a capsule.

Load the capsule into the autosampler.

Analysis Procedure


Fill the following fields in the database: **Sample name, Weight, Method, Sample type, Calibration number**

The "Tomato Sauce" method shows the following parameters:

Protein factor: 6.25

O₂ flow rate: 300 ml/min

O₂ factor: 1.4 ml/mg

Press  to start the analysis.

Analysis time: from 3 minutes for one run.

Typical Results on Tomato Sauces

Results have been obtained with the following calibration curve: in a range of 0 – 3.8 mg N with 7 measurements of EDTA standard (N% = 9.57) (Code A00000149).

The data obtained are included in the tolerance admitted by the EDTA certificate.

The table below shows the nitrogen/protein reproducibility of 2 Tomato Sauces analyzed using He as carrier gas.

Sample	Sample quantity (mg)	Nitrogen %	Protein %
Matriciana sauce	255,60	0,661	4,132
	257,90	0,661	4,130
	260,00	0,671	4,195
	255,80	0,657	4,104
	265,10	0,673	4,204
	259,60	0,648	4,053
	Average ± SD%	0.662 ± 0.009	4.136 ± 0.057
RSD% *	1.393	1.371	
Datterini sauce	255,90	0,247	1,545
	258,60	0,245	1,531
	252,60	0,247	1,544
	250,20	0,242	1,513
	258,30	0,244	1,523
	259,70	0,247	1,546
	Average ± SD%	0.245 ± 0.002	1.534 ± 0.014
RSD% *	0.842	0.892	

Expected Protein Value: for Matriciana sauce P%=4.1, for Datterini sauce P%= 1.5

Protein Factor: 6.25

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

Conclusion

The determination of nitrogen and protein in tomato sauces using NDA701 provides reliable and reproducible results. The data confirm the complete combustion of the sample with no memory effect observed when changing sample.

Results are extremely reliable and reproducible, as demonstrated by the RSD, since the goal is to obtain < 2.0% relative standard deviation, as requested by official methods.