# **Application Short Note DUMATHERM**

Nitrogen/Protein in Soy Flour



# Applied method (e.g. AOAC, DIN, EN, ISO, EPA, ASTM, §64, company sop, etc.)

AOAC 992.23: grains and oilseeds; DIN ISO 16634-1: Food products - Determination of the total nitrogen content by combustion according to the Dumas principle and calculation of the crude protein content.

Instruments	
1	Analytical Balance (readability 0,1 mg or better)
	Homogenizer, e.g. Speed Rotor Mill, Pulverisette 14 (Fritsch), 0,75 mm sieve size
3	DUMATHERM N Pro, standard configuration

Gases and Consumables						
1	Helium and Oxygen, bottle gas, min. quality grade 5.0					
2	Nitrogen or compressed air as bottle gas, min. quality grade 2.6.					
:	DumaReact, Combustion Reactor, packed with catalyst,	14-0245				
4	DumaTube, Quartz glass for reactor,	14-0203				
5	DumaFoil, Tin Foil for packing the samples,	14-0017				
6	DumaEDTA, Standard for Calibration, purity > 99 %,	14-0032				

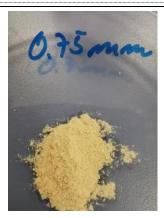
Method Settings	
Sample Weight	250 +/- 10 mg
Packing of the sample	Tin foil 14-0017
Combustion Method	B 1,8 (0 <sub>2</sub> dosing 300 ml 0 <sub>2</sub> / min, 1.8 ml 0 <sub>2</sub> / mg sample
Protein Factor	6,25
Combustion temperature [°C]	1030
Reduction temperature [°C]	750
Recommended Calibration Range	1 – 25 mg N abs. (EDTA, 20 equidistant points, 10-250 mg)

### Homogenization / Preparation

The sample was measured as received. In case the level of homogenization is not resulting in acceptable repeatability's according to the above mentioned norm (sd<=0,29), the sample was additionally grinded to 0,75 mm sieve size with a sneed rotor mill







Set of soya samples

sample as received

ground to 0,75mm

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#### Weighing process

The samples are weight into tin foil and compressed with DumaPress for standardization of the weighing process.



#### Example Results

Results with sample as received already pre-grinded:



## **Dumatherm Nitrogen / Protein Analyser**

Serial Number: 10023 Submitter: Internal FAPAS reference
Software Version: DUMATHERM MANAGER V8.11 Operator: Dr. Werner Küppers

Date	Time	Sample name	Weight [mg]	Moisture [%]	Protein factor	Nitrogen Peak Area [mV*s]	N Weight [mg]	Nitrogen [%]	Protein [%]
01.10.2020	12:57:16	7450	251,900	0,00	6,25	7,773E+04	19,790	7,856	49,10
01.10.2020	13:02:54	7450	253,000	0,00	6,25	7,738E+04	19,704	7,788	48,68
01.10.2020	13:08:25	7450	251,700	0,00	6,25	7,831E+04	19,937	7,921	49,51
01.10.2020	13:13:57	7450	255,200	0,00	6,25	7,989E+04	20,336	7,969	49,80
01.10.2020	13:19:31	7450	257,400	0,00	6,25	7,999E+04	20,361	7,910	49,44
01.10.2020	13:25:02	7450	252,700	0,00	6,25	7,852E+04	19,991	7,911	49,44

Calibration number for N WKU 300320 Full Ran EDTA and standard name :

Method: B1,8

Sample Table :

Temperatures: Flow Rates: Carrier Gas: He Times:

Combustion Reactor 1029 °C He(FC1): 195,0 ml/min Sample Delay 7 s Reduction Reactor 750 °C He(FC2): 199,0 ml/min Sample Stop 11 s Degassing Oven 300 °C Oxygen 299,0 ml/min Run Time Auto

The sample was measured as received. In case the level of homogenization is not resulting in acceptable repeatability's according to the above mentioned norm of sd<=0,29, the sample has to be grinded additionally to 0,75 mm sieve size with a speed rotor mill.

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7,893

0,062

0,790

Average

RSD [%]

Standard Deviation

49,33

0,39

0,79

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Results with the same sample, now ground to 0,75 mm sieve size:



7,913

0,028

0,355

49 46

0,18

0,35

Average

RSD[%]

Standard Deviation

### **Dumatherm Nitrogen / Protein Analyser**

Serial Number: 10023 Submitter: 0,75mm grinded
Software Version: DUMATHERM MANAGER V8.11 Operator: Dr. Werner Küppers

Date	Time	Sample name	Weight [mg]	Moisture [%]	Protein factor	Nitrogen Peak Area [mV*s]	N Weight [mg]	Nitrogen [%]	Protein [%]
02.10.2020	09:49:56	7450	256,800	0,00	6,25	7,983E+04	20,321	7,913	49,46
02.10.2020	09:55:27	7450	252, 100	0,00	6,25	7,838E+04	19,954	7,915	49,47
02.10.2020	10:01:02	7450	256, 200	0,00	6,25	7,972E+04	20,292	7,920	49,50
02.10.2020	10:06:42	7450	258, 400	0,00	6,25	8,075E+04	20,552	7,953	49,71
02.10.2020	10:12:13	7450	250, 400	0,00	6,25	7,781E+04	19,812	7,912	49,45
02.10.2020	10:17:50	7450	252,500	0,00	6,25	7,800E+04	19,861	7,866	49,16

Calibration number

for N WKU 300320 Full Ran EDTA

and standard name :

Method : B1,8
Sample Table : bar magen 2

Temperatures:		Flow Rates:	Carrier G	Sas: He	Times:	
Combustion Reactor	1029 °C		He(FC1):	195,0 ml/min	Sample Delay	7 s
Reduction Reactor	750 °C		He(FC2):	199,0 ml/min	Sample Stop	11 s
Degassing Oven	300 ℃		Oxygen	299,0 ml/min	Run Time	Auto

The repeatability limits of AOAC 992.23 ( $s_r \le 0.29$  for % Protein) were met.

#### Remarks

It is important to take a representative sample weight of the well homogenized sample material.

Mix the sample before weighing thoroughly with a spatula to receive a representative sample portion for weighing.

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