

Protein determination in plant-based meat alternatives

KjelDigester K-449, KjelMaster K-375 with KjelSampler K-377:

Nitrogen and protein determination in plant-based meat alternatives according to the Kjeldahl method

1. Introduction

Plant-based meat alternatives are gaining popularity as a result of growing health and climate concerns. Being based on proteins derived from plants instead of traditional protein sources of animal origin, these products are being critically evaluated not only for their taste and texture but also for their nutritional value. An easy and reliable Kjeldahl method for the determination of total nitrogen and protein in plant-based meat alternatives, is presented below.

2. Experiment

Sample:

Plant based meat

Equipment:

KjelDigester K-449, Scrubber K-415 TripleScrub ECO, KjelMaster K-375 with KjelSampler K-377

Procedure:

In this method, samples are digested using the KjelDigester K-449. Distillation and boric acid titration are performed with the KjelMaster K-375 and KjelSampler K-377. A combination of the KjelDigester K-449 and KjelMaster system K-375/K-377 offers high sample throughput.



Table 1. Method parameters for KjelMaster K-375.

Parameters	Settings
Reaction time	5 s
Distillation time	240 s
Titration type	Boric acid
Sensor type	Potentiometric

3. Results

Results of the determination of protein in different plant-based meat samples are shown in Table 2.

Table 2. Results of the determination of protein in different plant based meat samples (n=3).

Sample	Labelled protein content [g/100g]	Ø determined protein content [%]	RSD [%]
Vegan cold cuts	6.5	6.93	1.32
Vegan fish sticks	12.6	12.76	5.91
Vegan sausage	17	16.44	0.11
Vegan burger	18	17.77	0.37
Vegan steak	20	19.68	0.95
Vegan soya schnitzel	49	47.39	0.04

4. Conclusion

The determination of nitrogen and protein in plant-based meat alternatives using the KjelDigester K-449 and KjelMaster system K-375/K-377 provides reliable and reproducible results. These results correspond well to the labelled values of the products with low relative standard deviations (RSD) except for vegan fish sticks where the sample matrix requires thorough homogenization pertaining to the different parts of the product with different nutritional composition and physical characteristics. For further information please download the full application note from the website.

5. References

Application Note No. 395/2020: Protein determination in plant-based meat alternatives
AOAC 920.87

Nitrogen and protein content measurement and nitrogen to protein conversion factors for dairy and soy protein-based foods: a systematic review and modelling analysis (<https://www.who.int/publications/i/item/9789241516983>)

KjeldahlOptimizer App

Operation Manual of KjelDigester K-446/K-449

Operation Manual of Scrubber K-415

Operation Manual of KjelMaster system K-375/K377