Method Novalab 010 / version 9: The measurement of dry matter and moisture from food, plant material, food supplements and feed

1. Reference

AOAC 2002 950.46 39.1.02 modified

2. Field of applications:

Method is suitable for food, plant material, food supplements and feed

3. Apparatus

- precision balance, min 1,0 mg
- food processor
- drying ovens 60 °C and 105 °C
- porcelain or quartz crucibles, beakers or other suitable dishes
- desiccator containing desiccant

4. Drying sample in 60 °C oven

The sample is homogenized by the food processor. The dish is weighed. Suitable amount of the homogenized sample is weighed into the dish. Then the sum of the weight of the sample and the dish is measured. The samples are dried in the 60 °C ± 10 °C drying oven 1 - 3 days. The sum of the weight of the dried sample and the dish is measured.

5. Drying sample in 105 °C oven

The sample is homogenized by the food processor. The dish is weighed. Suitable amount of the homogenized sample is weighed into the dish. Then the sum of the weight of the sample and the dish is measured. The wet samples are dried in the 102 - 105 °C drying oven 1 - 3 days. The samples rich of sugar such syrup or honey are dried at least 2 - 3 days. Dry samples are dried in the 102 – 105 °C drying oven 4 hours. The dried samples are transferred into the desiccator. After the sample is cooled to room temperature the sum of the weight of the dried sample and the dish is measured.

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6. The results

The dry matter is calculated from:

$$\text{Dry matter (\%)} = \frac{(m_3 - m_1) \times 100\ \%}{(m_2 - m_1)}$$

m_1 = the weight of the dish, g

m_2 = the sum of the weight of the sample and the dish, g

m_3 = the sum of the weight of the dried sample and the dish, g

The moisture is calculated from:

The moisture (%) = 100 % - dry matter (%)

English version
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Method Novalab 009 / version 9: The measurement of ash from food, plant material, food supplements and feed

1. Reference

NMKL 173 : 2005 modified

2. Field of applications:

Method is suitable for food, plant material, food supplements and feed

3. Apparatus

- precision balance, min 1,0 mg
- food processor
- drying ovens 60 °C and 105 °C
- muffle furnice 550 °C
- porcelain or quartz crucibles, beakers or other suitable dishes
- desiccator containing desiccant

4. Ashing of sample

The sample is homogenized by the food processor. Suitable amount of the homogenized sample is weighed into the dish. The samples are dried in the 60 °C ± 10 °C drying oven 1 - 3 days or in 102-105 °C oven over night. Dried sample is grinded. Grinded and mixed sample is weighed into porcelain or quartz crucibles and ashed in muffle furnice at 550 °C ± 25 °C 3 hours. The ashed sample is cooled to room temperature in the desiccator before weighing.

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5. The results

The ash is calculated from:

$$\text{Ash (\%)} = \frac{(m_3 - m_1) \times 100\ \%}{(m_2 - m_1)}$$

m_1 = the weight of the crucible, g

m_2 = the sum of the weight of the sample and the crucible, g

m_3 = the sum of the weight of the dried sample and the crucible, g

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Method Novalab 001.A / version 17: The measurement of nitrogen and protein from food, plant material food supplements and feed

1. Reference

AOAC 2002 2001.11 / 4.2.11 modified

2. Field of applications:

Method is suitable for food, plant material, food supplement and feed

3. Apparatus

- precision balance, min 1.0 mg
- food processor
- mill
- 60 °C oven
- Digestion tubes
- Digestor, Tecator
- Kjeltec nitrogen analyser with steam distiller and automatic titrator

4. Reagents

- water : prepared by ion exchange
- conc. H_2SO_4
- catalyst: $CuSO_4$ – K_2SO_4 mixture (8:1 w/w)
- 1 M NaOH solution
- 40 % (w/V) NaOH
- Indicator solution : 100 mg bromocresol green + 70 mg methyl red in 170 ml methanol
- boric acid solution: 100 g boric acid + 5 l water + 170 ml indicator solution + 2,5 ml 1 M NaOH solution + 5 l water
- 0.1 M HCl solution (titration solution)
- calibration standard solution: 1000 mg/l $(NH_4)_2SO_4$
- control standard solution : 2000 mg/l NH_4Cl

5. Analysis

The wet sample is grinded and mixed by food processor and dried in 60 °C oven. Dry sample is grinded by mill. 0,5 – 2 g sample , 2 g catalyst and 10 ml conc H_2SO_4 is added in digestion tubes. The sample is digested by digestor at 390-400 °C temperature but not over 400 °C until the colour of sample solution is changed to

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green. The sample solution is cooled to room temperature. Water is added in sample solution so that total solution volume is abbroximately 50 ml.

50 ml water as black sample, 20 ml calibration standard solution and 30 ml control standard solution are analysed by Kjeltec 2300 analyser to checking the quality of measurements. The digested sample solution is then analysed.

6. The results

The content of N is calculated from:

$$N_{sample}\ (mg / g) = \frac{20\ mg\ N_{Standard} \cdot V_{HCl,\ sample}}{V_{HCl,\ 20\ mg\ standard} \cdot m_{sample}}$$

$20\ mg\ N_{Standard}$ = 20 ml 1000 mg/l calibration solution

$V_{HCl,\ 20\ mg\ standard}$ = comsumption of titration solution when calibration standard solution analysed , ml

$V_{HCl,\ sample}$ = comsumption of titration solution when sample solution analysed , ml

m_{sample} = the weight of the sample, g

$$Protein\ (\%\ w/w) = \frac{N_{sample}\ (mg / g) \cdot 100\ \% \cdot 6.25}{1000}$$

$$Protein\ (\%\ w/w) = \frac{N_{wheat\ sample}\ (mg / g) \cdot 100\ \% \cdot 5.7}{1000}$$

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Method Novalab 076 / version 2: The measurement of fat from food , plant material, food supplements and feed

1. Reference

NMKL 131 : 1989 modified

2. Field of applications:

Method is suitable for food , plant material, food supplements and feed

3. Apparatus

- precision balance, min 1,0 mg
- food processor or mill
- Soxcap 2047 hydrolysis equipment
- Soxtec 2050 auto fat extraction equipment
- 60 °C oven
- 102 - 105 °C oven
- aluminium cups

4. Reagents

- Water : prepared by ion exchange
- 6 M HCl
- petroleum ether bp 40 – 60 °C
- Celite 566

5. Analysis

The wet or dry sample is grinded and mixed by food processor. 1- 2 g of the sample is then weighed into a SoxCap glass capsule. 800 ml 6 M HCl is added. Sample is kept in the Soxcap 2047 hydrolysis equipment throughout the hydrolysis, filtration and washing process. After hydrolysis the sample is dried in 60 °C oven. Dried and hydrolyzed sample is moved to the Soxtec 2050 auto fat extraction equipment. Petroleum ether is added to the aluminium cups in a closed system. The aluminium cups are heated by the electric heating plate. The extraction consists of boiling, rinsing, solvent recovery and pre-drying. After solvent extraction the aluminium cups are dried in 102 - 105 °C oven before weighing.

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6. The results

The content of fat is calculated from:

$$\text{Fat (\%)} = \frac{(m_2 - m_1) \times 100\ \%}{m_3}$$

m_1 = the weight of the aluminium cup, g

m_2 = the sum of the weight of the fat and the aluminium cup, g

m_3 = the weight of the sample, g

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Method Novalab 030 / version 2: Carbohydrate in food, plant material, food supplements and feed

1. Field of applications:

Method is suitable for food, plant material, food supplements and feed. Carbohydrate include polyols, monosaccharides, disaccharides, oligosaccharides, polysaccharides such as lignin, starch, glycogen, hemicellulose and cellulose.

2. Analysis

Carbohydrate is calculated by results of measurements of dry substance, moisture, ash, protein and fat.

Methods and references:

Dry substance and moisture: AOAC 2002 950.46 39.1.02 modified (Novalab 010 version 9)
Ash: NMKL 173 : 2005 modified (Novalab 009 version 9)
Protein: AOAC 2002 2001.11 / 4.2.11 modified (Novalab 001.A, version 17)
Fat: NMKL 131 : 1989 modified (Novalab 076, version 2)

3. The results

Carbohydrate, calculated = 100 % - (moisture + ash + protein + fat) %

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