Supelco®
Analytical Products

Application Note

Total Phosphorus in Meat and Meat Products

(according to German Food and Feed Code §64 LFGB 06.00-9)

Note

Pursuant to the valid copyright regulations this application note contains only a rough description of the content of the official method followed by a detailed description of the specific measurement procedure with the Spectroquant® Prove Spectrophotometers. A detailed description of the method specific handling steps can be found in the official method of the German Food and Feed Code §64 LFGB 06.00-9 [1].

Method

Most foods containing phosphorus compounds. Especially foods with rich content of proteins like milk and dairy products or meat and poultry are sources of phosphorus compounds.

The total phosphorus content in meat and meat products is determined after dry ashing followed by acid hydrolysis. The prepared sample reacts with ammonium vanadate and ammonium heptamolybdate to form orange yellow molybdovanado-phosphoric acid that is measured photometrically at 430 nm.

This method is based on the official method of the German Food and Feed Code §64 LFGB 06.00-9 [1] and describes the determination of the total phosphorus in in meat and meat products.

Measuring range

Method 2533	Phosphorus Meat §64 LFBG 06.00-9	0.000 – 2.500 g/100g P_2O_5

Sample

Meat and Meat products

Instruments, Reagents, and auxiliaries

Cat. No.	Description
1.73026	Spectroquant® VIS Spectrophotometer Prove 100 plus or
1.73027	Spectroquant® UV/VIS Spectrophotometer Prove 300 plus or
1.73028	Spectroquant® UV/VIS Spectrophotometer Prove 600 plus
114946	Rectangular cells 10 mm
100452	Nitric acid 65% for analysis EMSURE®
101226	Ammonium monovanadate GR for analysis
101182	Ammonium heptamolybdate tetrahydrate GR for analysis
119898	Phosphate standard solution traceable to SRM from NIST KH_2PO_4 in H_2O 1000 mg/l PO_4 Certipur®

Also first generation Prove instruments are compatible and preprogrammed with this method.

MERCK

Additional needs

- Quartz or porcelain dishes
- Watch glass
- Muffle furnace
- Crucible tongs
- Exicator
- Water bath
- Folded filter, phosphate free
- Graduated cylinders, 10 mL, 20 mL
- Volumetric flasks, 100 mL, 1000 mL
- Standard laboratory glassware (e.g. glass beakers) and pipettes
- Analytical balance

Preparing the solutions

- **Ammonium monovanadate solution** – The solution must be prepared according to German Food and Feed Code §64 LFGB 06.00-9 [1].
- **Ammonium heptamolybdate solution** – The solution must be prepared according to German Food and Feed Code §64 LFGB 06.00-9 [1].
- **Reagent solution** – The solution must be prepared according to German Food and Feed Code §64 LFGB 06.00-9 [1].

Sample preparation

According to German Food and Feed Code §64 LFBG 06.00-1 [2].

Procedure

Dry ashing

- Weigh sample to a dish and follow the procedure according to German Food and Feed Code §64 LFGB 06.00-4 [3].
- Note the sample weight.

Sample Solution preparation

Hydrolyze the obtained ash according to the procedure of German Food and Feed Code §64 LFGB 06.00-9, chapter 7.3 [1].

Phosphorus determination

- **Reagent blank**
- Mix 2 mL of distilled water with 8 mL Reagent solution and incubate for 15 min at room temperature. The color of the measurement solution remains stable for 30 min.
- **Sample** - Mix 2 mL of the prepared Sample solution with 8 mL Reagent solution and incubate for 15 min at room temperature. The color of the measurement solution remains stable for 30 min.

Measurement

Note

It is advisable to measure the reagent blank and the sample using the same cell as the one used for the zero adjustment or else a cell with identical optical characteristics and an identical absorption (matched pair).

- Open the methods list (<Methods>) and select Method No. 2533 „Phosphorus Meat §64 LFGB 06.00-9".
- The instrument automatically prompts a "Zero adjustment".
- For the zero adjustment fill a clean and dry 10-mm rectangular cell with distilled water.
- After prompting, insert the filled rectangular cell into the cell compartment. The zero adjustment is performed automatically.
- Confirm the performance of the zero-adjustment procedure by clicking on **<OK>**
- A window with an input field to enter the sample weight pops up.
- Enter the weight of the sample in grams (g), accurate to 0.001 grams (g), confirm with **<OK>** and click on **<START>** to switch to the measurement procedure.

Note

It is possible to enter a sample weight in a range of 0.010 to 10.000 g.

- Fill the prepared reagent blank into a clean and dry 10-mm rectangular cell. Insert the cell into the cell compartment. The measurement is performed automatically. A (✓) symbol appears behind the cue "Insert Reagent Blank".
- Confirm the measurement by clicking on <OK>.
- Finally fill the prepared sample solution into a clean and dry 10-mm rectangular cell. Insert the cell into the cell compartment. The measurement is performed automatically. A (✓) appears behind the cue "Insert Sample".
- Confirm the measurement by clicking on <OK>
- Read off the result in g/100g P_2O_5 and the absorption for the reagent blank (A_{RB}) and the sample (A_{Sample}) from the display.
- Tap the **<START>** button to start the measurement procedure for the next sample.

Method control

- The method can be checked using Cat. No. 119898 Phosphate standard solution traceable to SRM from NIST KH_2PO_4 in H_2O 1000 mg/l PO_4 Certipur®.
- Dilute this solution to 10 mg/100 mL P2O5 (= 100 mg/l P_2O_5) with water for analysis or distilled water.
- Dilution: 1000 mg/l PO_4 ≙ 747.3 mg/l P_2O_5 →10 mg/100 mL P_2O_5 (= 100 mg/l P_2O_5)
- Place 2.676 mL **Cat. No. 119898** Phosphate standard solution 1000 mg/l PO_4 into a 20 mL volumetric flask and fill up to the mark with distilled water.
- Mix 2 mL of the prepared Standard solution with 8 mL Reagent solution and incubate for 15 min at room temperature. The color of the measurement solution remains stable for 30 min.
- Measure this solution versus a reagent blank as described in the section "Measurement". Hereby enter a weight of 1.00 g.

Note

Due to the different sample preparation procedure and phosphorus determination procedure of the 10 mg/100 mL P2O5 standard solution compared to a sample analysis it is necessary to recalculate the displayed result manually as follows:

Measured Concentration standard [mg/100 mL] =

Displayed result [g/100 g] x F1 / F2 =

Displayed result [g/100 g] x 1000 / 100 =

Displayed result [g/100 g] x 10

F1 = 1000 = recalculation g/100 g to mg/100 mL

F2 = 100 = Factor sample preparation for real sample

Adjustment

- In case of significant deviations in the method control procedure the preprogrammed factor of 27.99 or the current factor used in the calculation of the displayed results can be adjusted by the user.
- The corrected factor must be recalculated as follows:

  Factor corrected = Current factor x (target value standard / measured and recalculated value standard)

- To edit the preprogrammed factor, select method 2533 from <Methods>.
- Close the window for the “Zero adjustment” by clicking on <X>.
- Close the input field for the sample weight by clicking on <X>.
- Click <Settings> and select the list “FACTORS”.
- Tip on the input field “Factor”, enter the corrected factor and confirm by clicking on <OK>.
- Close the window for the “Zero adjustment” by clicking on <X>.
- For the next measurement restart the method by selecting the method anew from <Methods>.

Note

To find the used factor, select Method 2533 from <Methods>.

Close the window for the “Zero adjustment” by clicking on <X>.

Close the input field for the sample weight by clicking on <X>.

Click <Settings> and select the list “FACTORS”.

Literature

- German Food and Feed Code §64 LFGB 06.00-9:2008 Bestimmung des Gesamtphosphorgehaltes in Fleisch und Fleischerzeugnissen.
- German Food and Feed Code §64 LFGB 06.00-1:1980 Vorbereitung von Fleisch und Fleischerzeugnissen zur chemischen Untersuchung.
- German Food and Feed Code §64 LFGB 06.00-4:2017 Bestimmung der Asche in Fleisch, Fleischerzeugnissen und Wurstwaren.

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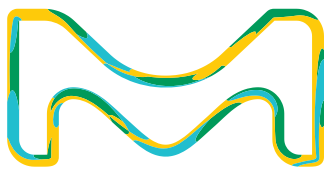

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