# Metrohm

# Thermo. Titr. Application Note No. H-086

| Title: | Determination of Sodium in Potato Chips |
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| **Scope:** | Determination of sodium in potato chips (crisps) and similar fried snack foods |
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| **Principle:** | Titration of an unfiltered suspension of the sample with a standardized solution of aluminium containing a stoichiometric excess of potassium ions in the presence of ammonium hydrogen difluoride at ~ pH 3 to give an exothermic reaction, forming insoluble $NaK_2AlF_6$. |
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$$Al^{3+} + Na^+ + 2K^+ + 6F^- \leftrightarrow NaK_2AlF_6 \downarrow$$
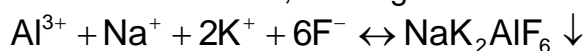
| | The titrant is standardized against a solution prepared from anhydrous sodium sulfate or sodium carbonate |
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| **Reagents:** | *Titrant:* Mixed 0.5 mol/L $Al(NO_3)_3$, 1.1 mol/L $KNO_3$ solution. <br> *Conditioning reagent:* 300 g/L $NH_4F \cdot HF$ |
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| **Method:** | *Basic Experimental Parameters:* |
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| Titrant delivery rate (mL/min.) | 4 |
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| Titrant pre-dose (mL) | 0.2 |
| Delay before titration commences (sec) | 60 |
| No. of exothermic endpoints | 1 |
| Data smoothing factor (DSF) | 45 |
| Stirring speed (802 stirrer) | 15 |

*Sample preparation:* Crush the potato chips to coarse crumbs in the bag. Weigh accurately approximately 10 g of crushed chips into a clean, dry 200 mL blender container. Add 150 mL D.I. water by bulb pipette. Place on a blender for 60 secs., until a stable suspension with minimum settling is produced.

*Titration program:* The titration program is set up to pre-dose 0.2 mL of titrant before the actual tiitration starts. A delay of 60 seconds is programmed to allow an initial precipitate seed surface upon which subsequent precipitate may grow rapidly. This helps to improve the precision of the method. The pre-dose volume is added to the titrant volume at the endpoint to obtain the actual titrant consumption.

| | *Titration:* Weigh accurately 25-30 g of homogenized suspension into a titration vessel. Add 20 mL D.I. water and 5 mL 300 g/L $NH_4F \cdot HF$ solution. |
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| **Examples:** | *Analysis of flavoured potato chips (crisps) – Woolworths Home Brand Variety pack* |
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| | **Chip Flavour** | **Sodium, mg/100g** | |
|---|---|---|---|
| | | **As per label** | **Analyzed here** |
| | Regular | 570 | 875 ± 15 (n=5) |
| | Chicken | 874 | 857 ± 13 (n=5) |
| | Barbecue | 898 | 1132 ± 13 (n=5) |
| | Salt & Vinegar | 1100 | 1545 ± 20 (n=5) |
| | Sour Cream & Onion | 810 | 826 ± 14 (n=5) |

| **Calculations:** |
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| *1. Calculation of mass of chips in aliquot.*<br><br>Mass of chips in blender = c<br><br>Mass of water in blender = w<br><br>Mass of aliquot taken for analysis = s<br><br>Mass of chips in aliquot (m) = s x c/(w+c)<br><br>*2. mg Na/100mg product:*<br><br>$$= \frac{((\text{titre, mL} - \text{blank, mL}) \times M \text{ Al} \times AW \text{ Na} \times 100)}{m}$$ |

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***Thermometric Titration Plot:***

**Legend:**
*Red = solution temperature curve*
*Black =second derivative curve (for endpoints)*



Sodium by Al, K - C:\Program Files\Titrotherm\MDF\sodium_in_chips_BBQ-3.MDF

EP1: 1.863ml
IP1,D2 Min -H
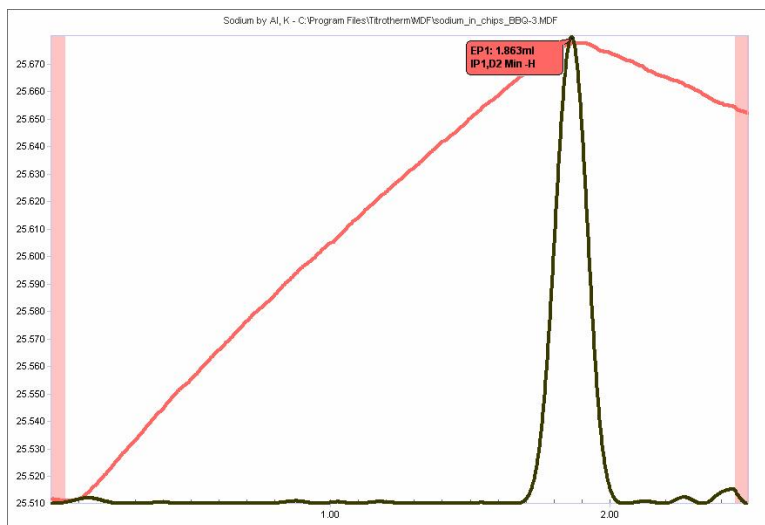
*Titration of sodium in barbecue flavoured chips*

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