

Simple and direct sodium determination

Sodium determination is becoming ever more important for the food industry. Conventional sodium testing methods demand complicated sample preparation, complex instrumental setup, as well as knowledge and experience in analytical techniques. METTLER TOLEDO presents a new analytical method dedicated to the simplified, yet highly accurate determination of sodium.

Salt is an essential ingredient in processed foods and its content needs to be determined accurately. The ever increasing health awareness and demand for accurate food product labelling drives the requirement not only for the determination of sodium chloride, but also of sodium cations, which must be declared separately. This is particularly important since the excessive intake of salt is directly linked to adverse health effects.

Multiple Standard Addition technique is a new simple and effective application for the specific and accurate determination of the sodium ion content.

The determination of sodium cations is performed with ion-selective sensors. As the membrane potential cannot be observed directly, the potential of the ion-selective electrode (ISE) half-cell is measured against a reference half-cell.

A small amount of sodium standard solution (dV_s) of known concentration is added to the sample solution in multiple incremental steps (Figure 1).

The addition of the standard increases the sodium concentration (c_x) in the sample. The potential difference (dE) resulting from the known volumes of added standard (dV_s) are used to determine the sample concentration (c_x) directly, using an iterative evaluation algorithm that is based on the Nernst equation.

The conventional techniques used for sodium determination – atomic absorption spectroscopy (AAS), inductively coupled plasma emission spectroscopy (ICP) and ion chromatography (IC) – require external calibration and elaborative sample preparation. The investment required in these, mostly large, devices is relatively high in comparison to other analytical equipment. They furthermore demand a high level of training and in-depth knowledge of instrument operation. As a result of

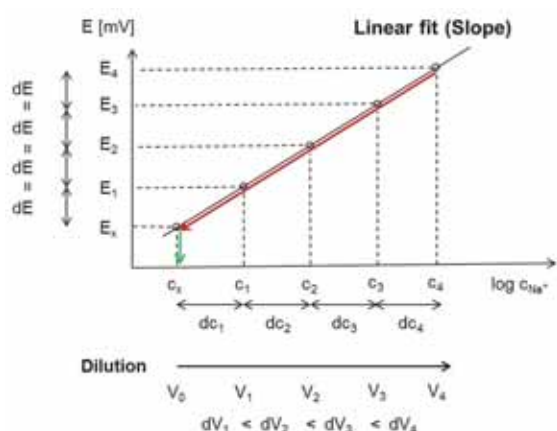


Figure 1: Using Multiple Standard Addition, the initial concentration (c_x) of the sample solution is extrapolated with the aid of a mathematical linear curve which is based on the Nernst equation



Figure 2: METTLER TOLEDO's Titration Excellence line allows fully automated sodium determination. Automating the process with the InMotion™ Sample Changer increases efficiency and provides a much higher throughput

these aspects, food companies are often left reliant on external analytical labs, thus prolonging and complicating their quality control processes.

In contrast, the direct sodium analysis with the Multiple Standard Addition technique on a METTLER TOLEDO titration instrument is significantly simpler. No calibration of the sensors is necessary and sample preparation is straightforward and quick. The whole process is so simple that the analysis can even be performed by low-skilled operators. The Multiple Standard Addition method is highly accurate and ensures repeatable results comparable to conventional analytical techniques. The ease of use and high accuracy of the Multiple Standard Addition technique allows food companies to perform their own analyses rather than having to rely on external analytical labs.

The Multiple Standard Addition technique is supported by the METTLER TOLEDO Sodium Analyzer and the Excellence line titrators:

The stand-alone Sodium Analyzer is a compact and simple instrument intended for manual measurements. Thanks to its compactness and accuracy, routine measurements can be performed easily in any lab.

With the Excellence line titrators, the sodium content of several sample series can be fully automated. This considerably increases efficiency. The highly versatile Excellence titrators make the Multiple Standard Addition technique possible for other ions such as fluoride, chloride, nitrate, potassium and calcium. The modular setup of the Titration Excellence line expands the analysis range from potentiometric methods to Karl Fischer titrations – all in one device. This unique attribute contributes to enabling the analysis of a wide range of parameters required in the Food and Beverage industry and fulfilling all requirements expected of a modern analytical device.

Find selected applications for the fully automated ion content determination using the Multiple Standard Addition technique, as well as dedicated high throughput applications for other food relevant features in the METTLER TOLEDO application brochure 45. Download the brochure now for free from www.mt.com/excellence-in-food.

Get All You Need



METTLER TOLEDO



In One Box...

...and stay flexible with new Titration Excellence!

Just like a Bento Box, the new Titration Excellence line enables you to benefit from utmost flexibility with a single device. Modularly adjusts your device to suit specific applications, fit your workflow, comply with regulations and accommodate every users work style.

Increase your efficiency: The new Applications Brochure «Titration automation in the Food and Beverage industries» explains in easy-to-apply examples the possibilities and benefits of automating determinations like chloride, sodium, acidity or water content. Learn more about:

- high throughput automation in F&B
- simultaneous titration of different parameters
- multi-parameter analyses with combined METTLER TOLEDO devices

Visit our page and download the application brochure for free.
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