

MobiLab® 130 – Powered by ORS Technology

Sodium Application Note

One Resonance Sensors' MobiLab® 130 offers a portable Nuclear Magnetic Resonance (NMR) analyzer for rapid, precise element concentration measurements in any environment. The MobiLab® 130 is capable of conducting single or multi-element analysis; it delivers reliable results for Na, Li, B, Cl, Al, P and more.

Using NMR technology, the MobiLab® 130 is able to measure a range of sodium concentrations, from 0.01 wt % up to solutions saturated in sodium. For example, saturated sodium chloride solution at about 28 wt % NaCl or 11 wt % Na.

The MobiLab® 130 is fully optimized and easy to operate. Available as a laboratory instrument or an on-line process control solution, it uses proprietary technology to determine the concentration of sodium in solution by exploiting the magnetic resonance signal of the 100% naturally abundant nucleus, ²³Na. Calibration is done with a single standard reference, making the measurement convenient and accurate, while significantly reducing the complexity of the analysis. For many foods such as brines, condiments, and dressings, no sample preparation is necessary. Meats, cheeses and other semisolids require minimal sample preparation.

Advantages

MobiLab® 130's innovative analytical method is:

- **Portable:** Weighing only 18 pounds, the MobiLab is robust and compact
- **Efficient:** With minimal to no sample preparation, testing times are reduced
- **Precise:** Results are more precise due to the elimination of sample preparation errors
- **Direct:** Specific interrogation of the sodium atom with no interference from other ions in the sample

Methodology

The MobiLab® 130 completes a measurement from start to finish in **less than 15 seconds per sample**.

MobiLab® 130 measurements are based upon NMR, a bulk analysis method that is unaffected by sample color, clarity, content of other ions, nor presence of dispersed particles. As such, it can readily measure the entire range of samples encountered in the food industry. Sample preparation consists of pipetting 0.5 mL into a 5 mm diameter tube. The tubes may be rinsed and re-used.

The NMR signal is directly proportional to the number of nuclei in the sample. Therefore, the MobiLab® 130 gives a linear response to the sodium concentration. This fundamental property allows the MobiLab® 130 to use a simple calibration method.

Traditional Measurement Methods

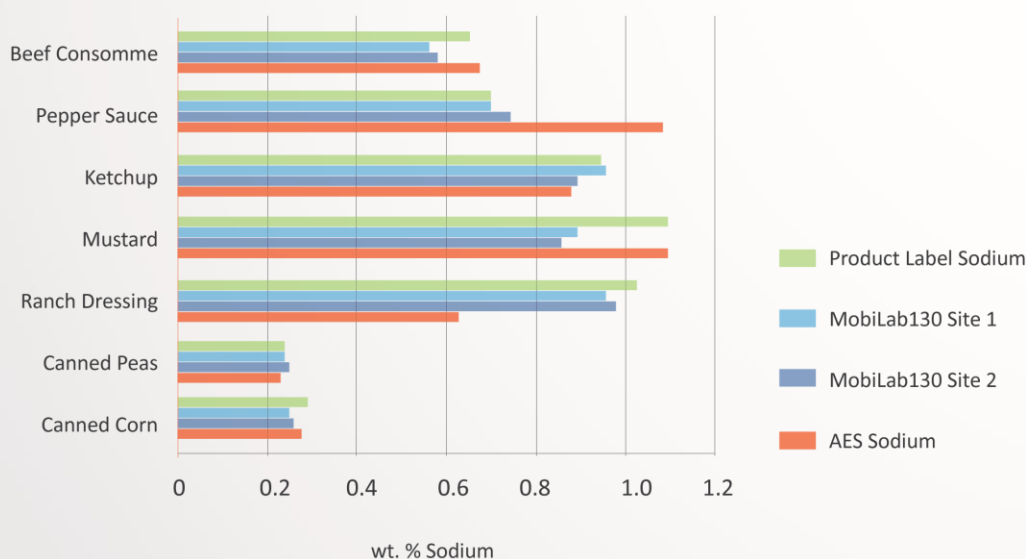
Currently, the food industry relies upon two standards to measure sodium content. The first is Atomic Emission Spectroscopy (AES). Most food samples are well above the working level of AES and therefore samples must be diluted to a measurable range and they must be subjected to digestion with both an acid and an oxidizer to release bound sodium. The digestion process requires up to 30 minutes per sample. Although most recipes for specific foods are well established, the digestion and dilution steps tend to be sources of measurement error. Where AES is subject to interferences from other ions including potassium, established methods call for measuring extra samples, which vary the background concentration of these elements in order to determine whether a correction is necessary. Finally, AES requires the participation of a trained analyst, substantial consumables and regular maintenance.

A second common methodology is titration for chloride ion. This is an indirect measurement. The sodium level is inferred because the primary source of sodium comes from the addition of sodium chloride during the manufacturing process. Titration, like AES, requires manipulation of the sample by digestion, followed by a 5-minute procedure to titrate the resulting solution. Although the method itself is rather straightforward, the titration technique uses standardized silver nitrate solution, which is expensive, making titration both time-consuming and costly on an on-going basis. When replacing the titration method, the return on investment for the MobiLab® 130 is likely to be mere months.

MobiLab® vs. AES

The graph below shows results for identical products tested by atomic emission spectroscopy (AES), the industry standard testing methodology, compared with the results from two separate laboratories using two different MobiLab® 130 instruments. The MobiLab® 130 results demonstrate consistency, particularly in light of the examinations being conducted by two different instruments in two independent laboratories. Unlike the AES results, note that the MobiLab® 130 values *do not have outliers*. This is because the sample preparation is minimal; therefore the method reproducibility is very close to the sample repeatability.

Sodium Levels: MobiLab® 130 vs. AES



MobiLab® 130's Improvements to Sodium Analysis

In comparison to existing methods for testing sodium, MobiLab® 130 significantly improves processes while supporting high throughput capabilities. The MobiLab® 130 uses no consumables and eliminates the need for expensive reagents. The instrument delivers a quick return on investment by accelerating time to results, optimizing both product and process. Leveraging NMR technology driven by a user-friendly interface, the instrument is designed to reduce user error while increasing analysis output over that of conventional methods.

In a major innovation for its category, the MobiLab® 130 ensures that many samples are measured *as-is*. MobiLab® 130 significantly improves upon traditional elemental analysis methods, providing single and multi-element testing within a sole instrument. Its rapid, precise analysis capabilities directly meet the needs of a wide range of users.