



• **the minispec** TD-NMR Snack Food Analyzers

Rapid quality-control, process-control, and R&D through minispec TD-NMR analyses

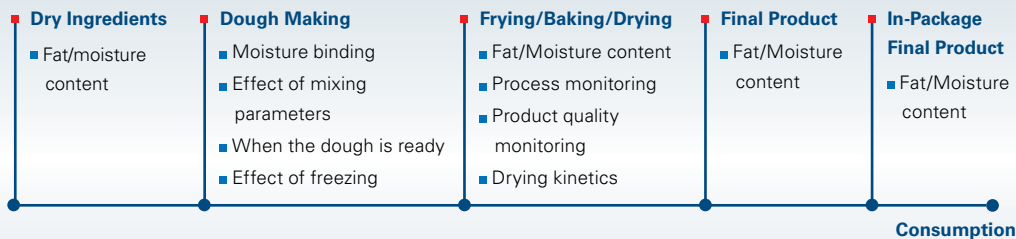
- Fat/Moisture content in snack food
- Salt/Spice/Color content has no effect
- Water binding in dough
- Fat/Moisture in powdered ingredients
- Fat/Sugar crystallization kinetics
- Fundamental molecular investigation on rheology
- Droplet size distribution in o/w or w/o emulsion
- In-package finished product analysis
- Non-invasive measurements in seconds
- No solvent or drying involved
- Unsupervised automated measurement
- Certified official SFC standard provided with instrument

Bruker's versatile and easy-to-use bench-top TD-NMR analyzer is a turn-key solution for rapid Quality/Process control in snack food manufacturing. It acquires time-domain data in a matter of seconds to quantitatively determine physical and chemical properties of materials. The signal is obtained from the hydrogen atomic nuclei present in the samples. The relaxation behaviors of the NMR signal from different molecules in the sample are distinguishable. The TD-NMR signal is also a clear signature of molecular mobility. Hence, it is a very good phase sensor, as well. Because this technique looks at fundamental molecular level and correlates to macroscopic properties of samples, minispec serves as a powerful tool for in-depth research.

the minispec ProFiler: take NMR to product

the minispec ProFiler is a single-sided NMR device perfectly tailored to industrial QC applications. This probe can be used to do in-situ NMR measurement of large objects. Available automation provides spatial mapping. The ProFiler can be used with swappable inserts/resonators to obtain signal from depth of 0mm, 3mm, or 5mm inside the sample.

Uses for the minispec During Snack Food Production



Time Domain-NMR Advantages

- Analysis is fast, typically few seconds.
- Only few samples (3-5) are required for instrument calibration.
- Repeatability and reproducibility of minispec analysis are typically much superior as compared to wet chemical approaches.
- TD-NMR analysis eliminates labor-intensive and time-consuming wet chemical methods.
- The minispec analyzer is simple to operate, even by untrained personnel.
- Versatile approach: usually minispec systems can be used for various applications, not just for a single analysis/application.
- Samples can be either liquid, powder, pellet, film or plate; all forms are suitable to be analyzed with the minispec.
- Analysis is non-invasive, non-destructive, so measurement can be repeated as often as desired.
- Depending on sample homogeneity, the minispec measurement volume can be adapted using various available probe sizes.
- As the NMR signal is generated by all hydrogen nuclei within the entire sample volume, the result does not depend on sample surface or sample color. It is a true bulk measurement.
- The TD-NMR prediction is not affected by salt or spice content.

the minispec Snack Food Analyzer Options

- minispec mq-one Analyzer for dedicated PC/QC applications (e.g. fat and moisture in finished/unfinished products, solid fat content, etc.).
- minispec mq-series for versatile use (fat/moisture content, crystallization kinetics, water binding or interaction with macromolecules, emulsion stability, research, etc.).
- Fixed temperature: Sample chamber is regulated by magnet temperature, i.e. probe temperature from 35 °C to 45 °C.
- Variable temperature by external heating / cooling water bath, maximum -5 °C to +65 °C.
- Wide-range variable temperature using gas flow system, maximum -100 °C to +200 °C.
- Peltier heating/cooling blocks with precise digital controls are available to preheat samples to reduce batch sample measurement (automated/manual) time.
- Probe size range: 7.5mm to 89mm diameter.
- Magnetic field strength range: 6MHz to 60MHz ¹H frequency.

Pulsed Field Gradients / Profiling, Diffusion and Droplet Analysis

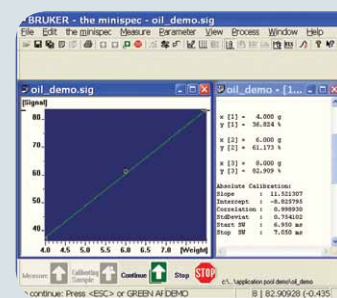
Various Gradient Systems / Probes are available with variable temperature capability. Software available for free / restricted diffusion (droplet size) analysis, and one-dimensional imaging.

Software

Full programming flexibility by minispec ExpSpel experiment editor for definition of :

- NMR pulse sequences
- NMR data processing including ILT
- Customized automation, etc.

mq-Series systems come with a large application pool, including almost all widely used and well-established TD-NMR pulse sequences.



Measurement Details

Sample preparation:

Placing in the tube.

Measurement time:

Few seconds.

Instrument adjustment for each sample:

Not required.

Accuracy:

Depends on accuracy of the reference values provided during calibration. Usually correlation coefficient, $R2 \geq 0.999$.

Precision: $\pm 0.01\%$

Detection Limit:

Fat as low as few milligrams can be measured using minispec. Detection level depends on sample volume, measurement time, magnetic field strength and probe used, etc.

Bruker BioSpin
is ISO 9001 certified.

Magnetic safety measures apply to the operation of the minispec.

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