



the minispec mq20

● Contrast Agent Analyzer

The minispec is used to characterize and validate relaxation properties of pharmaceuticals known as “contrast agents” for MRI (Magnetic Resonance Imaging).

- Win expensive MRI time
- Operates all common pulse sequences for T_1 , T_2 relaxation time analysis, at a touch of a button
- Easy siting, benchtop, no high and radio frequency shielding required
- Cryogen free permanent magnet
- Simple sample handling and measurement
- Attractive price compared to MRI systems
- Only little amount of expensive contrast agent required for characterization

TD-NMR Contrast Agent Analysis

The minispec Contrast Agent Analyzer is used to study the effect of pharmaceuticals known as “MRI contrast agents” on the NMR relaxation of protons in water or fat. Contrast agents are used to enhance contrast in Magnetic Resonance images between tissues that otherwise would be difficult to differentiate. These are especially soft tissue of the central nervous, digestive, lymphatic and cardiovascular system, liver, breast and lung.

Design of a successful contrast agent requires conflicting pharmaceutical and MRI properties to be met at once: although metal ions like Mn^{2+} and Gd^{3+} may lead to a very good contrast enhancement, they need to be chelated because the applied concentrations of the ‘naked ions’ are toxic.

The minispec mq-series of bench-top NMR instruments play a key role in characterizing and validating the properties of contrast agents. The task is to examine the T_1 and T_2 relaxation time shortening of fat and water protons by contrast agents. The fat and water protons are predominantly responsible for the MR image.



Bruker is the only vendor offering 40 and 60 MHz systems for contrast agent research.

A contrast agent will always accelerate the relaxation resulting in a positive or a negative contrast enhancement. Contrast agents like gadolinium, manganese chelates and iron salts lead to a T_1 signal enhancement. Superparamagnetic iron particles (SPIO), barium sulphate, air and clay have been used to lower the T_2 signal. Clinical MRI systems are certainly capable of the measurements, but MRI time is expensive and valuable for clinical investigations. The compact minispec is the perfect solution for such relaxation studies, because it offers systems providing the same magnetic field strength (e. g. 0.5 T, 1.0 T and 1.5 T) like clinical MRI systems.

The minispec Contrast Agent Analyzer is a sophisticated NMR instrument, yet is simple to use. Many researchers have chosen to use the minispec for routine analysis, since it provides a performance advantage due to faster setup and simple single button operation, which triggers acquisition, data processing and reporting. It can be fully automated with an autosampler, for unattended operation.

Bruker is the only vendor offering table-top 40 and 60 MHz systems dedicated to contrast agent research. With Bruker's range of magnet systems available between 7.5 and 60 MHz, and further accessories like sample temperature control systems, full characterization of the designated contrast agent is only a step away.

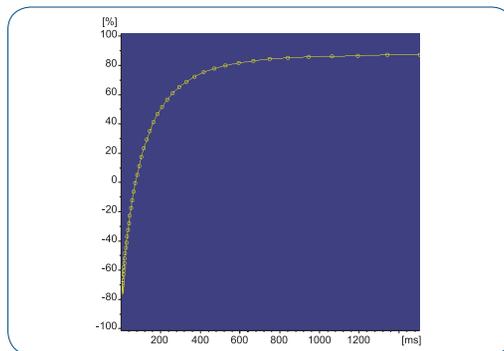


Figure shows T_1 analysis performed at 60 MHz using the minispec system.

Multiple Magnet Configuration

Contrast Agent Research often demands to analyse relaxation times at various field strengths as relaxation times are field dependent. Therefore Bruker offers a dedicated and cost effective solution.

Contrast Agent Analyzers:

- mq60 - for relaxation time analyses near the field of a 1.5 T Clinical MRI system
- mq40 - for relaxation time analyses near the field of a 1.0 T Clinical MRI system
- mq20 - for relaxation time analyses near the field of a 0.5 T Clinical MRI system
- mq10 - for measurement of relaxation time parameters at 0.23 T
- mq7.5 - for measurement of relaxation time parameters at 0.17 T

For contrast agent analysis the magnet temperature is typically set to 37 °C, but variable temperature probes are available too.

Specifications

Console with Broadband RF Electronics:

- Measuring frequency: 2 to 65 MHz
- Modulator: 0°, 90°, 180°, and 270° RF phase channels with an accuracy better than 0.2°
- Transmitter: maximum power 300 Watts, linear power attenuation
- Receiver: digital phase sensitive detection via quadrature detection; analogue and digital filters
- Pulse Programmer: 12 pulse channels, resolution 20 nsec; Digitizer: 12-bit, 32K points per single shot

Magnet Unit:

- Fields available: 0.17 T, 0.23 T, 0.47 T, 0.94 T, and 1.41 T

Probe Temperature Options

- Fixed Temperature: Sample chamber temperature is regulated by magnet heating system at a temperature fixed between 35 and 45 °C
- Variable Sample Temperature, + 5 to + 50 °C (mq40, mq60), - 5 to + 65 °C (mq20)
- Information about a broader temperature range on request

System Requirements

- Footprint: 75 x 65 cm (WxD)
- System Weight: ~ 120 kg depending on magnetic field
- Operating Temperature: 18 °C min., 28 °C max.
- Humidity: 20 - 80%, non-condensing
- Voltage Range: 100 - 240 VAC
- Frequency Range: 50 - 60 Hz.

Options

- Automation: Autosampler for unattended operation for more than 100 prepared samples. Barcode reader for sample tracking.