

# AT-NMR-3040H/3060H

Nuclear Magnetic Resonance/Magnetic Resonance Imaging



EPCC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

**Analytical Technologies Limited**

An ISO 9001 Certified Company

[www.analyticalgroup.net](http://www.analyticalgroup.net)

# Magnetic Resonance Imaging Instruments:

## 1 Tesla MRI Instrument

AT-NMR-3040H/ AT-NMR-3060H

The AT-NMR-AT-G1 is our highest field MRI available and accommodates 40 and 60 mm coil sizes. The 1 T field improves resolution and sensitivity to fully characterize healthy and diseased states of the major organs. Analytical Technologies Limited's analyzing and imaging software enable researchers to obtain a larger range of MRI images faster and more reliably. The hardware/software solution is rugged and durable, permitting novice users to acquire images using the most advanced protocols.

### Advantages

1. High resolution ( $< 80 \mu\text{m}$ ) gives remarkable image quality
2. 1 T magnetic field with high homogeneity and minimal eddy currents
3. Permanent magnet means no maintenance costs, no cryogenics, no liquid helium required
4. Multiple protocols, SE, FSE, GE, and more.
5. Small chassis means installation can be close to laboratory facilities where it is needed

### Applications

- Tumor Screening and sizing
- In vivo drug treatment evaluation
- Relaxation analysis
- Modeling of contrast agent specificity
- Diabetes and obesity studies
- Vascular evaluation

### Application Example

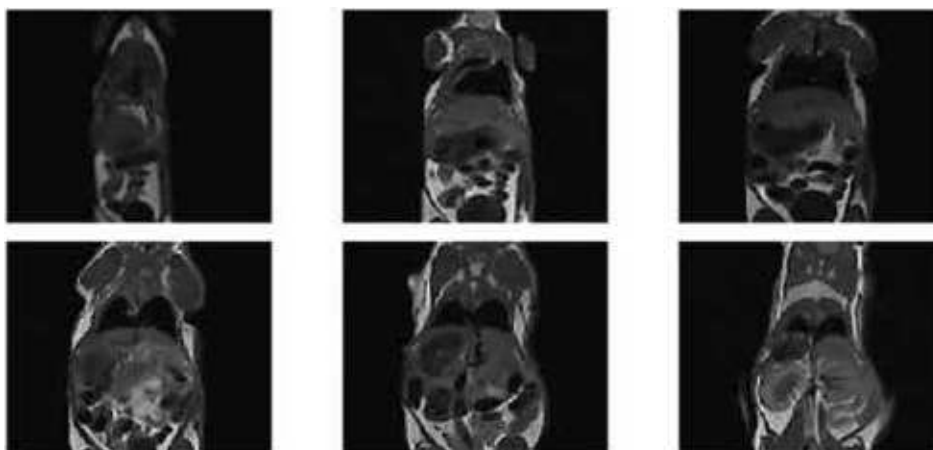
Case 1: MRI of 40g mice (coronal scan)

### Configuration

- Magnetic field strength:  $1.0 \pm 0.05\text{T}$
- Probe size:  $\varnothing 40\text{mm}$
- Weight: 1.1 tons (Magnet 1.0 tons, Control cabinet 0.1 tons)
- Footprint:  $1800\text{mm} \times 800\text{mm} \times 1200\text{mm}$



AT-NMR-AT1-3040H-I



The software of the AT-NMR can acquire image data with higher resolution and more quickly than our previous mode.

# MacroMR Instrument:

AT-MAC-3150H

The AT series was developed for imaging of large samples. The AT12 features an open design to accommodate large samples and is a revolutionary pre-clinical MRI system at an unbeatable price point. The AT12 is based on a permanent magnet and therefore requires no liquid helium or nitrogen and has no maintenance requirements. The 0.3T permanent magnet has very little fringe field so it can be installed into virtually any environment. The open design allows users to load their samples quickly and easily. The large probe size accommodates many variations of sample introduction such as flow-through tubing for flow-imaging and pressurized and elevated temperature sample holders for petrophysical applications. Additional magnets are available for prepolarization schemes to enhance the signal of flowing media.

## Application Areas:

### Agriculture

- Plant and soil water distribution and sequestration.

### Food

- Moisture and fat content and distribution in foods and food raw materials.
- Characterization of flow properties of foods under processing conditions.

### Life Science

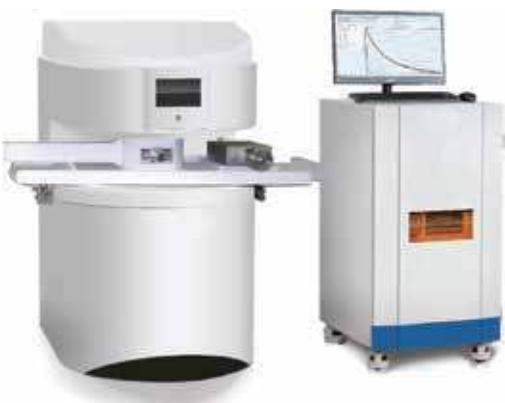
- Evaluation of contrast agents for in vivo monitoring of intravenous treatments and in vivo localization and evaluation of tumors.

### Petrophysical

Porosity, permeability and pore size distribution of core samples. Simulation of down-hole conditions and volume selection using 3D gradients. Imaging of porous media under reservoir conditions of temperature and pressure and imaging under conditions of core flooding of oil, water and gas.

### Configuration

Magnetic field strength:	0.3 ±0.05T
Probe size:	ø 150mm
Effective detection area:	ø150mmxH100mm
Operating Conditions:	Power supply: 220V, 50Hz
	Temperature: 22-28°C
	Humidity: 30-70%
Weight:	2.4 tons(Magnet 2.3 tons, Control cabinet 0.1 tons)
Footprint:	3300mmx1400mmx1350mm (Magnet, RF cabinet, Grad)



AT-MAC-3150H

## Application Examples:

### Porous Media

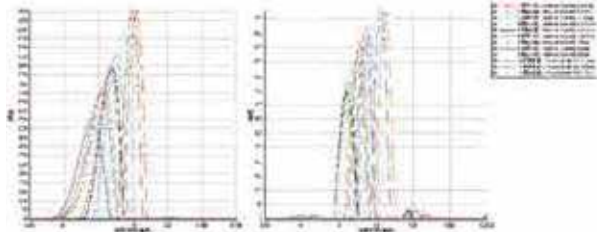


Figure 2.  $T_1$  and  $T_2$  spectrum of cement MK 100 during solidification over time

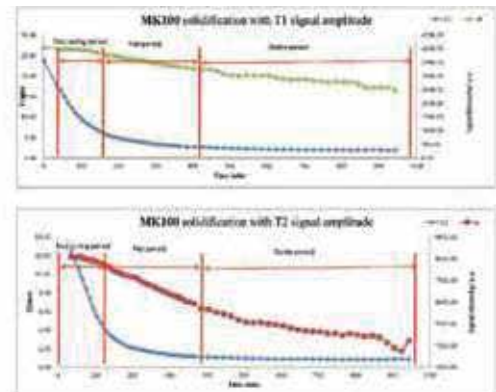


Figure 3. Relationship between  $T_1$  &  $T_2$  time and signal intensity of cement MK 100 over time

ATL can also be used in porous media analysis like cement, ceramic and so on. Figure-2 shows the  $T_1$  and  $T_2$  spectrum of cement MK100 during solidification over time. In the solidification, peaks move left and trend down. In Figure3, the whole solidification is divided into three periods. Signal intensity drops quickly in the first 120 minutes and head to flat period while the dropping trend is slowing down from 120 minutes to 400 minutes. After 400 minutes, the solidification of cement is almost completed according to the stable period of the signal intensity.

### Food

During the early stage (day 1 to 2) the image becomes brighter as the fruit ripens. The increase in brightness owes to the increase in water mobility which comes from maturation. The water distribution equilibrates throughout the fruit giving an increase in overall signal intensity by day 4. The increase in free water distribution hastens the maturation process and promotes regions of decay show in the day 6 image.

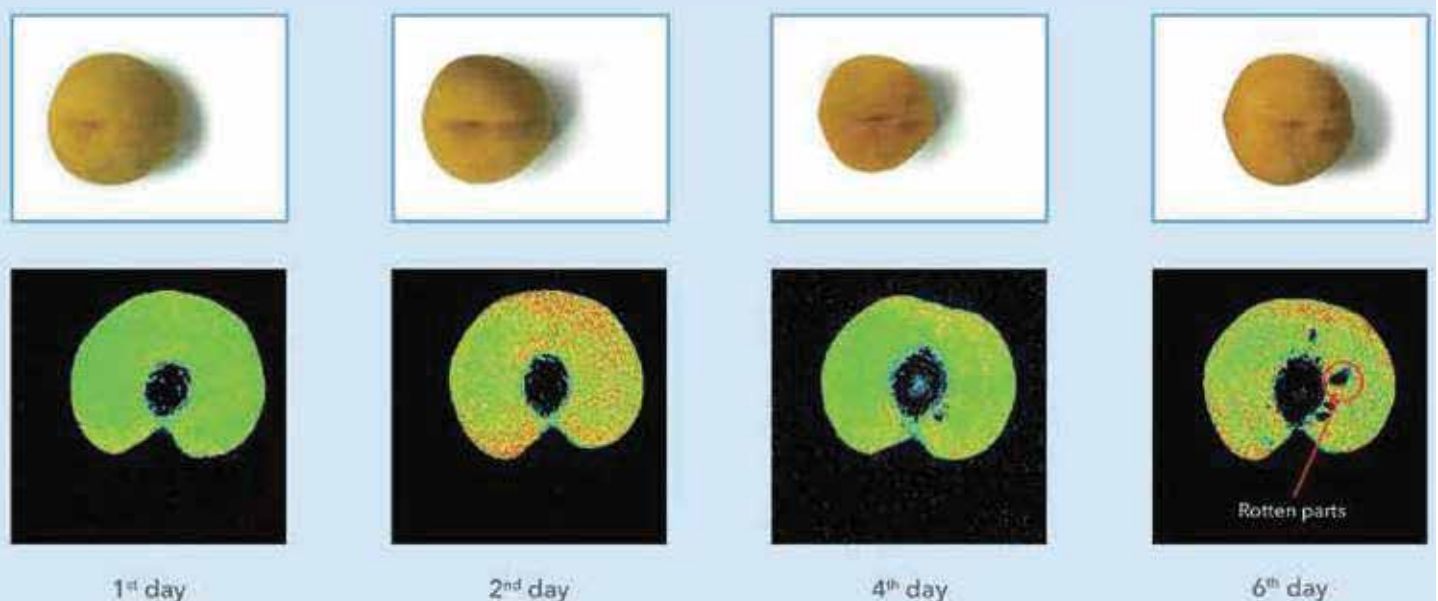


Figure 4. MRI monitoring fruit quality of a stored at 25°C

## Life Science:

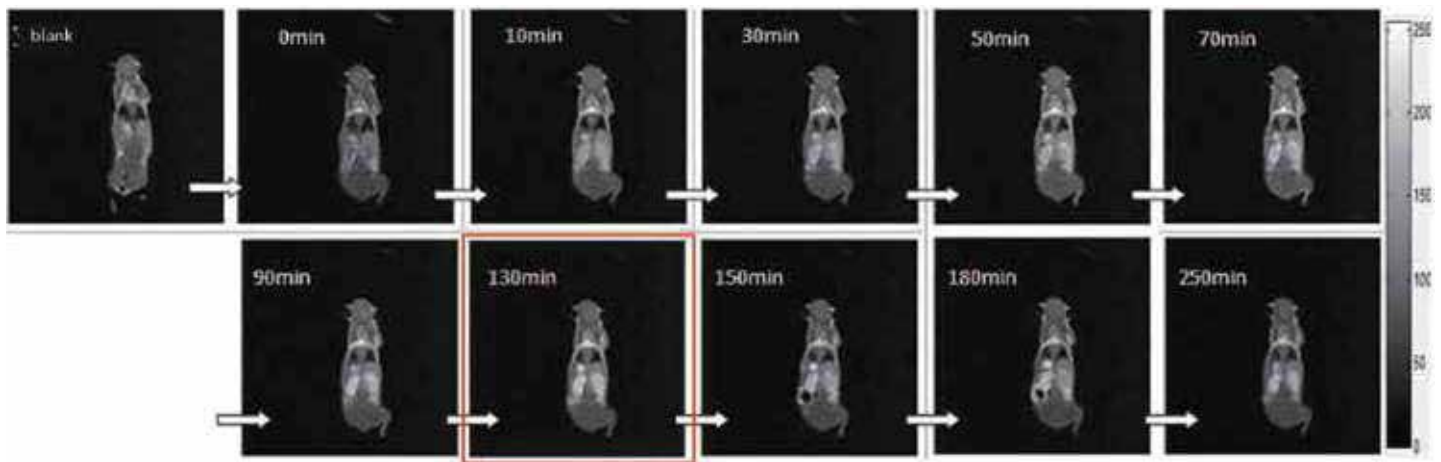


Figure 5. Contrast Agent Metabolism in Rat Liver

Evaluation of contrast agent metabolism in rat kidney. These images demonstrate that the maximum effect of the contrast agent is 130 minutes, whereas the lifetime of contrast agent is longer than 250 minutes.

## Petrophysical

Fracture identification in core samples by  $T_2$  relaxation

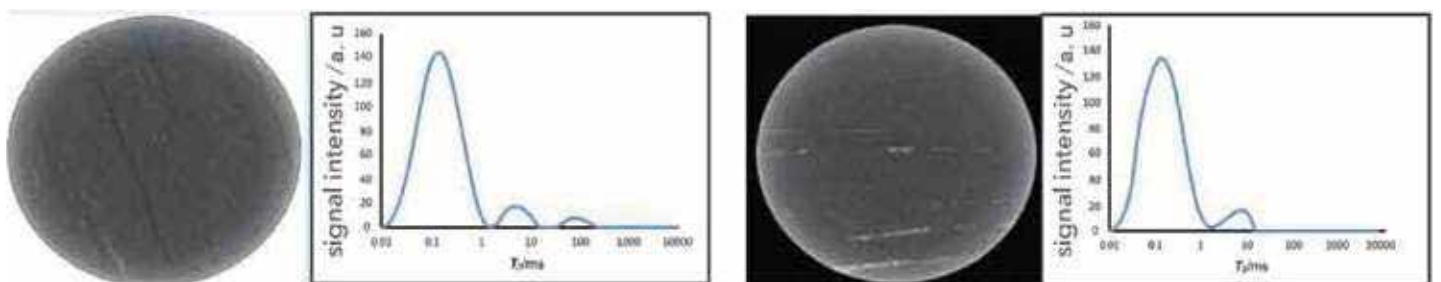


Figure 6. Existence of long relaxation water fraction indicates the existence of large fractures

7. Absence of long relaxation water indicates the only existence of small fractures

In Figure 6, the small peak present at 100 ms indicates a large fracture in the core sample, whereas Figure 7 has only short time relaxation component indicating either small scale fractures or no fractures at all.

## NMR Imaging And Analyzing System:

AT-MESO-3060H/AT-MESO-3060V

The AT-3060H 0.5 T MRI is widely used in many application areas. The 0.5 T field strength provides excellent sensitivity for a permanent magnet based MRI system used in the laboratory or pre-clinical environments. The AT-3060H is offered in both horizontal or vertical orientations to meet the research needs of different laboratories. The AT-3060H can accommodate a probe size up to 60mm bore for small animals. The through-hole design also allows the AT-3060H to accommodate pressure/temperature /flow cells to study rock cores under reservoir conditions or allow for a continuous flow of material to study flow properties.



AT-MESO-3060H-I(Horizontal)



AT-MESO-3060V-I(Vertical)

### Features

- Magnet Orientation: Horizontal or Vertical
- Rugged Design; Simplified Installation
- Intuitive Software; Obtain results quickly
- Robust Software: Easy to use by students
- Multiple Imaging Protocols: Address the needs of more researchers

### Application Agriculture

- Water distribution, migration, motility in plants
- Transportation and distribution of nutrients in plants during growth processes.
- Maturation of plants and fruit

### Life Science

- In vivo evaluation of contrast agents
- Evaluation of cancer treatments
- Drug target evaluation
- Tumor screening
- Body composition(fat/lean) of small animals

### Configuration

- Magnetic field strength:  $0.52 \pm 0.05$  T
- Probe size:  $\varnothing$  60 mm
- Weight: 0.8 tons (Magnet 0.7 tons, Control cabinet 100kg)
- Footprint: 1540mmx800mm x1200mm

### Petrophysical

- Porosity of porous media
- Pore size distribution
- Permeability
- Fluid saturation
- Physical property evaluation for porous media

### Food

- Oil /moisture content
- Quantitative analysis of free & bound water
- Water/oil distribution, migration and motility analysis
- Fluid flow analysis using MRI
- Spatially selective  $T_1$  &  $T_2$  Imaging



## Application Examples:

### Agriculture

#### Plant MRI Studies



Figure 8. Corn root MRI

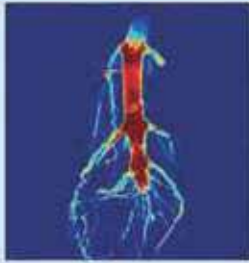
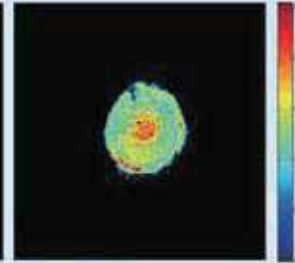
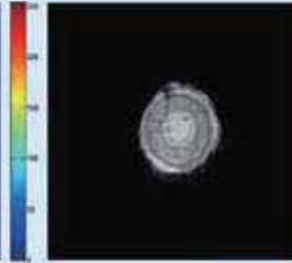


Figure 9. Poplar branch MRI



As shown in the images, the gray-level expresses the signal intensity. Higher is the gray-level, the stronger is the signal. For root and poplar branch, the high gray-level means the high content of water (especially free water). Furthermore, the images can reflect the plant growing process including respiration, substance transport, and nutrition accumulation, among others. Free water was influenced by water-soluble sugars and metabolic activity.

### Life Science

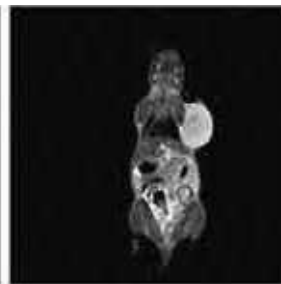
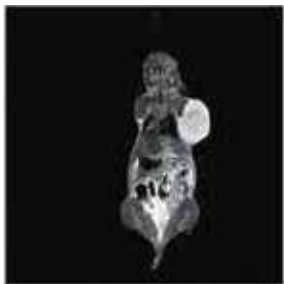


Figure 10. Evaluation of targeting property of contrast agent in tumor-bearing nude mice (T2-weighted image)

### Petrophysical

#### Granite freezing-thawing process

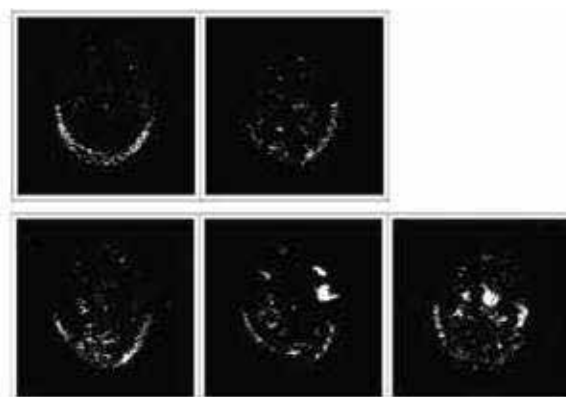
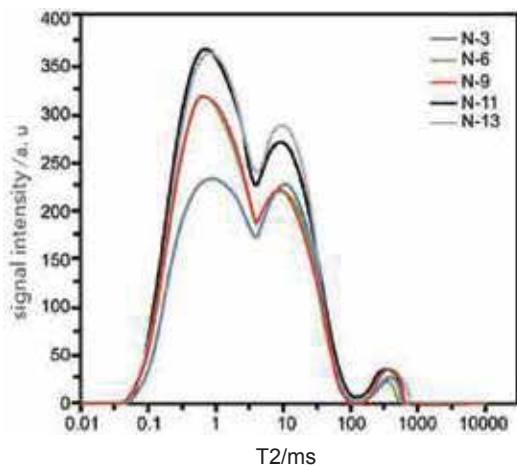


Figure 11. The comparison of MR transverse images of the water saturated granite under different freezing thawing times

Granite is first saturated with water and measured by NMR under different freezing-thawing times. The signal intensity implies the amount of cracks and pores in the granite. With the increase of freezing-thawing times, cracks grow in the granite with can be easily told by the rise of signal intensity and white area in the figure 11.

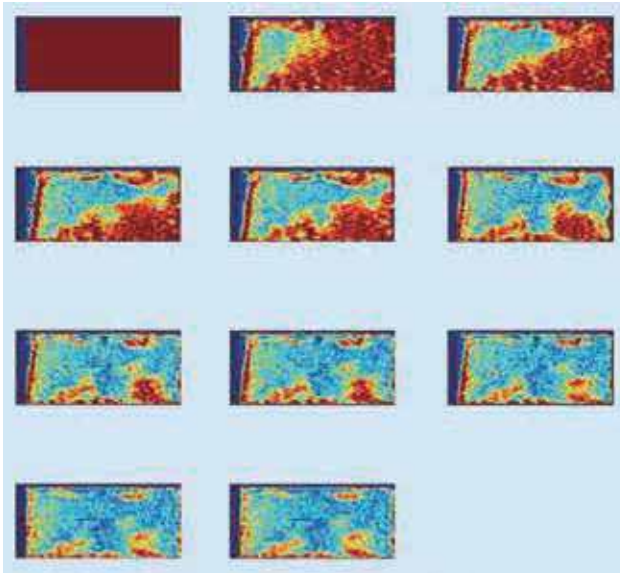


Figure 12. Monitoring the displacement of oil using aqueous MnCl<sub>2</sub> by MRI (with core flooding system)

1. Fluid from oil is coded as red whereas fluid from aqueous MnCl<sub>2</sub> appear blue-green. (MnCl<sub>2</sub> solution)
2. The images depict the entire process of water displacing oil and the relevant boundaries/barriers and channels.
3. The flow is quantified based on the discrimination of the oil phase and the aqueous phase and other factors such as flow pressure and the overburden pressure.

## Food

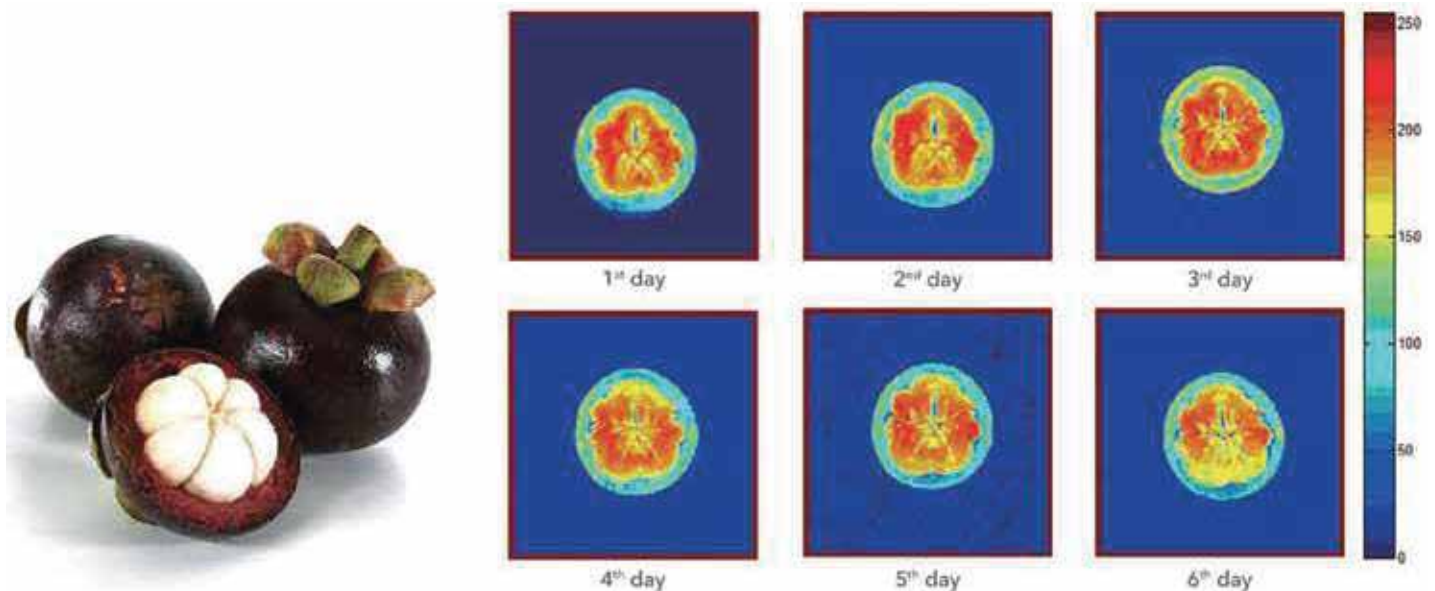


Figure 13. Changes in free/bound moisture in mangosteenfruit during storage at room temperature by MRI

The changes in the physical state of moisture in mangosteen fruit during storage at room temperature can be visualized by time-dependent MRI. Information about the decay process is available when combined with spatially selected NMR relaxation profiles.







## Contrast Agent:

The figure below presents two contrast agents at varying concentration but produce differences in the water T1 (brighter images show faster relaxation). Visualizing data can be utilized in vitro studies of how specific contrast agents bind to various cellular structures.

Using AT to visualize the effect of gadolinium-based contrast agents (GBCA), gadolinium Diethylene Triamine Pentaacetic Acid (DTPA) as a contrast agent for use in hepatobiliary MR imaging and gadolinium-bovine serum albumin (SSA) used in site specific binding studies.



Figure 16. T<sub>1</sub>-weighted imaging of different contrast agents at the same concentration.

The images intensity increases as the concentration of the contrast agent increases due to more efficient relaxation of water.

The AT series analyzers are available with magnetic field strengths from 0.05T to 0.3T with a range of probe sizes to optimise the sample size and sample type to the specific application. For example 2MHz Is specifically designed for rock core sample measurements of porosity, permeability and pore size distribution. The low field (0.05 T) is preferable due to the need to minimize artifacts due to magnetic susceptibility effects found in porous media.

## Core NMR Analyzer:

AT MICRO Series



AT-3015V-I

## Configuration :

- Magnetic field strength: 0.055+0.04T
- Probe size: Ø25.4 mm
- Effective detection area : Ø25.4 mm x H35mm (standard configuration)
- Weight: 85kg(Magnet box 25 Kg, Spectrometer 25 Kg, RF unit 35 Kg)
- Footprint: 1685 mm x 520mm x386 mm(HxWxD)

## Application:

### Test of Conventional Core

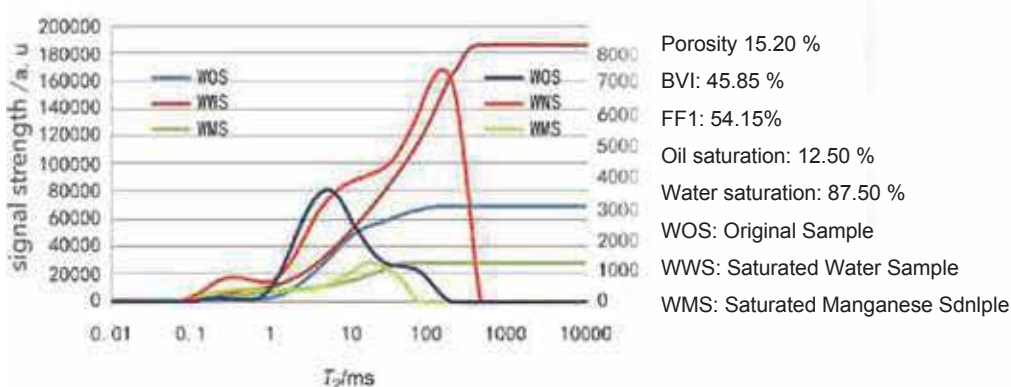


Figure 17. Calculus Spectra of Sandstone

The relaxation time of water is sharply shortened after samples were incubated in Mn<sup>2+</sup> solution which caused the water signal to be restrained completely; while the oil signal can be tested.

Porosity, BVI, and FF1 can be gained from the relaxation spectrum of saturated water sample, and the oil saturation and water saturation can also be obtained from the relaxation spectrum of the original samples and Mn-saturated samples.

## Shale NMR Analyzer:

AT-MICROS3025V

Shale is a unique example of a low -porosity and low-permeability porous material. As such, a stronger magnetic field is required to measure these types of core sample because of the Inherent low signal resulting from a low porosity material.



AT-MICROS3025V

## Configuration:

- Magnetic field strength: 0.3±0.01T
- Probe size: Ø25Amm
- Effective detection area: Ø25.4mmxH35mm
- Weight: 85 kg (Magnet box 25 kg, Spectrometer 25 kg, RF unit 35 kg)
- Footprint: 1685mm x 520mm x 386mm (H x W x D)

## Functions:

Analysis of conventional core pore structure and fluid saturation;  
Analysis of unconventional core (tight core, mudstone and shale)

## Application Example:

Table 1. Comparison of NMR and conventional method  
in core porosity measurement weight(%)AD(%)

NMR method vs. Weight method				
No.	shale 1#	shale 2#	tight shale 1#	tight shale 2#
	16.83%	17.41%	1.84%	1.01%
Buoyancy porosity	17.23%	17.58%	2.55%	1.66%

NMR porosity compares well to conventional buoyancy porosity results.

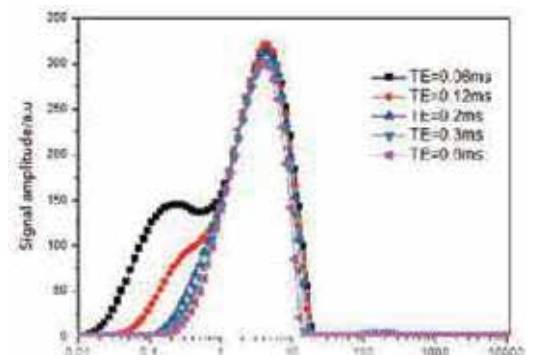


Figure 18. Comparison of shale relaxation time with different TEs

Comparison of shale relaxation time with different echo times (TEs)

## Drilling Fluid NMR Analyzer

AT-MICRODF 3025V



AT-MICRODF 3025V

The MICRODF 3025V NMR analyzer is designed especially for the analysis of drilling fluids. It can measure oil and water content of drilling fluid as well as physical properties such as the crude oil viscosity. It provides a new method for characterizing drilling muds and fluids.



## Applications

- ☑ Rapid determination of oil content and moisture;
- ☑ Monitoring the water and oil content changes of drilling fluid in real-time, and reflecting stratigraphy (discovering oil layers and water layers);
- ☑ Crude oil quality analysis;
- ☑ The effects of different additives on the drilling fluid properties;

## Application Example

Times	1#	2#	3#
1	0.511‰	0.980‰	5.023‰
2	0.498‰	0.943‰	4.970‰
3	0.499‰	0.957‰	4.922‰
4	0.461‰	0.938‰	4.979‰
5	0.506‰	0.965‰	5.015‰
6	0.506‰	0.962‰	5.063‰
7	0.513‰	0.962‰	4.974‰
8	0.511‰	0.930‰	4.995‰
9	0.494‰	1.001‰	4.966‰
10	0.499‰	0.971‰	5.108‰
11	0.501‰	0.964‰	5.005‰
Mean	0.500‰	0.961‰	5.002‰
RSD	2.862%	2.059%	1.013%

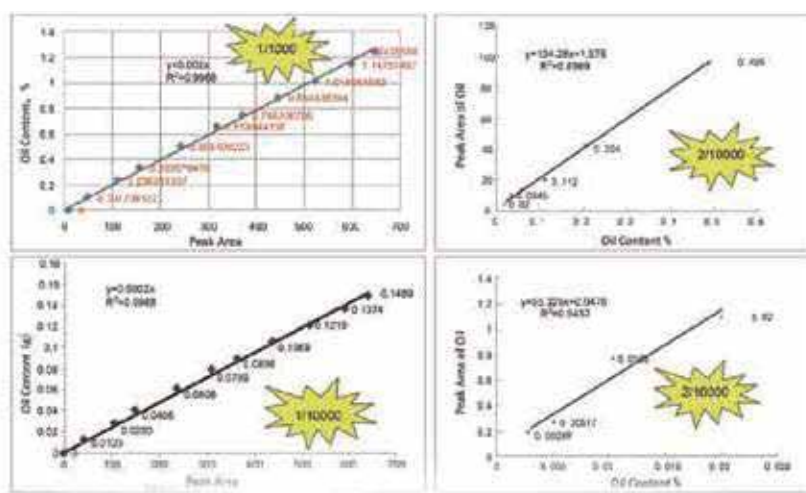


Figure 19. Result for oil content of drilling fluid  
The detection limits of oil content can down to 0.01 % with the accuracy of 0.002%.

## NMR Solid Fat Content Analyzer

AT-PQ 2010V



AT-PQ 2010V

The determination of solid fat content (SEC) by NMR is an internationally recognized standard. Analytical has been dedicated to research and develop NMR P0001 SEC Analyzer which offers the determination of SFC values



## Application Example

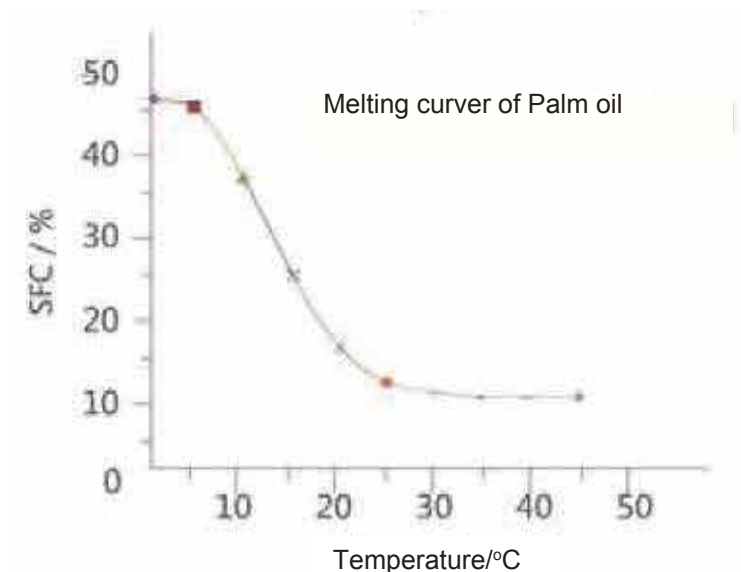


Figure 20. Solid fat content for palm oil as a function of temperature

1. The test process is very convenient with high sensitive FID signals.
2. Melting curve can be measured and crystallization course can be monitored.

## MRI Contrast Agent Analytical

AT-PQ 3015V

### Features

1. Relaxation analysis of T2 and T1 for CAs (Fe<sup>2+</sup> and Mn<sup>2+</sup>)
2. Relaxation analysis of coated tumor tissues
3. Relaxation analysis of cell suspensions

### Configuration

- Magnetic field strength: 0.5+0.08T
- Probe size:  $\varnothing$  10mm
- Effective detection area:  $\varnothing$ 10mm x H20mm
- Weight: 134kg
- Footprint: 1685mm x 520mm x 386mm



AT-PQ 3015V

## Application Example

Table 2. Relaxivity calibration of contrast agent in different concentration

	NO	Concentration	$T_1$ (ms)	$1/T_1$ (m-1)
Group 1	1-1	0.1	1386	0.722
	1-2	0.2	974.915	1.026
	1-3	0.4	594.885	1.681
	1-4	0.6	456.341	2.191
	1-5	0.8	351.782	2.843
	1-6	1	308.256	3.244
$r_1$ (Mm <sup>-1</sup> S <sup>-1</sup> )			2.851	

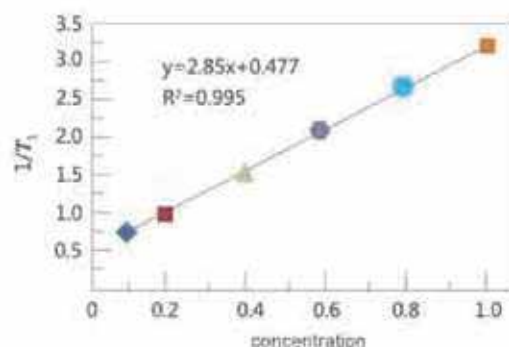


Figure 21. Relaxivity calibration curve of contrast agent in different concentration

The relaxation rate increases linearly with the increasing concentrations of CAs. And the relaxivity is the slope of the linearity.

## Spin Finish NMR Analytical

AT-PQ 3025V

### Configuration

- Magnetic field strength: 0.5±0.08T
- Probe size: 025mm
- Effective detection area: ø25mmxH25mm
- Weight: 134kg
- Footprint: 1685mmx520mmx386mm



AT-PQ 3025V

## Application Example



1. Accuracy: error is less than 0.1 % (sample with 5 % oil content) error is less than 0.02 % (sample with 0.5 % oil content)
2. Reproducibility: RSD < 2 %
3. Test limit oil content is 0.01 % in 1 g analytical Technologies Limited complies with the following international standards Iso 8292 AOCS Cd 16b-93

Figure 22. Photo of sample holder in (Left); Operation interface of spin software (right)

## Seed Oil Content NMR Analyzer

AT-PQ 3040V



AT-PQ 3040V

## Features

Measurement of seed oil and moisture content

## Configuration

- Magnetic field strength:  $0.28 \pm 0.05T$
- Probe size:  $\varnothing 40mm$
- Effective detection area:  $\varnothing 40mm \times H30mm$
- Weight: 85kg
- Footprint: 1685mm x 520mm x 386mm

## Application Indexes

1. Minimum detection limit: loornq water
  2. Sampl heklt <30mm
  3. Test range of seeds oil content: 0.03%~100%
- Accuracy: RD <2% (compared with Soxhiet extraction method)
4. Repeatability: RSD <2%, reliabitiy: RSD <2% RSD: relative standard deviation RD:relative deviation

## Application Example

Table 3. Comparison of NMR conventional method in oil/water content measurement of sunflower seeds

Oil contents in sunflower seeds -- NMR vs. Soxhlet extrator				
No.	Sample 1	Sample 2	Sample 3	Sample 4
NMR(%)	45.87	46.53	45.57	45.96
Soxhlet extractor(%)	46.35	46.13	46.27	46.53
Std Dev (%)	1.04	0.87	1.51	1.23
Water contents in sunflower seeds -- NMR -- NMR vs. Drying method				
No.	Sample 1	Sample 2	Sample 3	Sample 4
NMR(%)	6.41	6.37	6.6	6.42
Soxhlet extractor(%)	6.68	6.51	6.41	6.51
Std Dev (%)	4.04	2.15	2.96	1.38

## Online NMR Seed Classification system

AT OMR-3015V-S

The Online MR is an automated seed handling system and analyzer designed to measure thousands of seeds per day using NMR analysis. It is the world's first commercially available NMR based sorting device and can be adapted for other near-spherical media.

## Configuration

- Magnetic field strgth:  $0.5 \pm 0.08T$
- Probe size:  $\varnothing 15mm$
- Effective detection area:  $\varnothing 12.5mm \times H20mm$
- Weight. 200kg approximately
- Footprint: 1110mmx940mmx1510mm

## Appliation Exmple

	#479	#469	#130
mean	3.71%	3.38%	2.75%
max	3.97%	2.49%	2.84%
min	3.63%	2.20%	2.65%
max-min	0.34%	0.30%	0.19%
RSD	2.59%	2.90%	2.05%



Figure 1 AT OMR-3015V-I

## NMR Crosslink Density Analyzer

AT CD 3010V/ AT CD 3010V+

This is a variable temperature analyzer designed to work over a large temperature range necessary for measuring the cross-link density of a variety of polymers and thermosetting resins.

### Functions

1. Rapid cross-link density determination of rubbers and other polymers
2. Relaxation analysis of T<sub>2</sub> and T<sub>1</sub>
3. Determination of glass transition temperature T<sub>g</sub>
4. Quantitative analysis of water phase with varying-temperature

### Configuration

- Magnetic field strength: 0.5±0.08T
- Probe size: 0.10mm
- Effective detection area: 08.5mmxH25mm
- The sample temperature range:
  - +35°C to +150°C(VTMR20-010V-T)
  - +35°C to +200 °C (VTMR20-010V-T+)
- Weight: 330kg
- Footprint: 1400mmx670mmx1070mm

## Application

- ☑ Determination of cross-link density of rubbers and polymers;
- ☑ Quality control and assurance in polymer production;
- ☑ Quality inspection in polymer aging;
- ☑ Rubber vulcanization process optimization;
- ☑ Molecular mobility of solids, semi-rigid polymers, gels, emulsions and liquids;
- ☑ Detection of viscosity, state and process during the epoxy resin and rubber vulcanizing;
- ☑ Adhesion properties;
- ☑ Determination of plasticizer or rubber content in blended polymers;
- ☑ Determination of relative monomer content of copolymers;



AT VT 3010V+

## Application Example

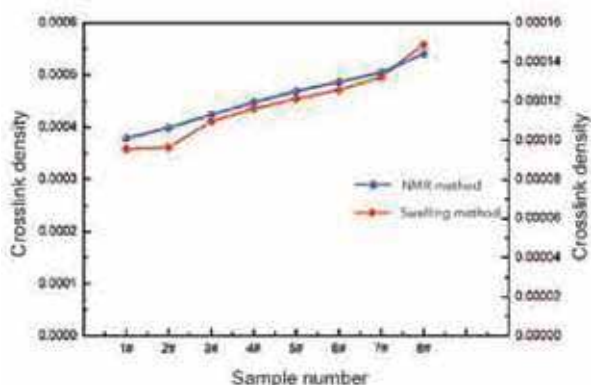


Figure 23. Comparison of NMR and conventional method in the measurement of crosslink density

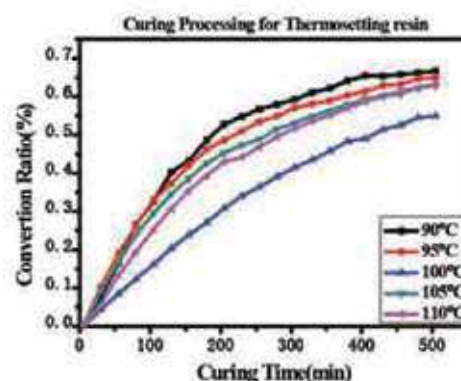


Figure 24. Characterization of curing time for Thermoset resin 0 100 200

## Cryogenic Nanopore NMR Analyzer

AT CN 3010V/ AT CN 3010V+



AT CN 3010V: air compressor; dryer; coolant trough; magnet; mainframe (left to right)



1. Accuracy: error is less than 0.1 % (sample with 5 % oil content) error is less than 0.02 % (sample with 0.5 % oil content)
2. Reproducibility: RSD < 2 %
3. Test limit oil content is 0.01 % in 1 g analytical Technologies Limited complies with the following international standards Iso 8292 AOCs Cd 16b-93

## Configuration

- Magnetic field strength:  $0.3 \pm 0.05$  T
- Probe size:  $\varnothing 10$  mm
- Effective detection area: 08.5 mm x H20 mm
- Weight: 330 kg (Magnet 150 kg, Control cabinet 180 kg)
- Footprint: 560 mm x 660 mm x 1170 mm

## Application Indexes

Temperature range:  $-30^{\circ}\text{C}$ – $40^{\circ}\text{C}$   
 (accuracy:  $\pm 0.01^{\circ}\text{C}$ )  
 Cooling rate:  $10^{\circ}\text{C}/\text{mm}$   
 Sample volume:  $\sim 1$  cm<sup>3</sup>  
 Pore size: 2 nm to 500 nm

## Product Advantages

- ☑ The cooling-gas supply system provides a stable and dry air flow for hours down to  $-60^{\circ}\text{C}$ ;
- ☑ Two-stage gas stream heating control the temperature precisely;
- ☑ Isolation of the sample temperature and magnet temperature provide a stable magnetic field.
- ☑ User friendly software automates the measurement from the initial set to results.

## Application Example

### 1 .Porous Silica

Amorphous silica has many industrial applications such as adsorption, filtration, extraction, catalysis and so on. The NMR cryogenic method is considered to be one of the most effective way to measure the pore size distribution of this material.

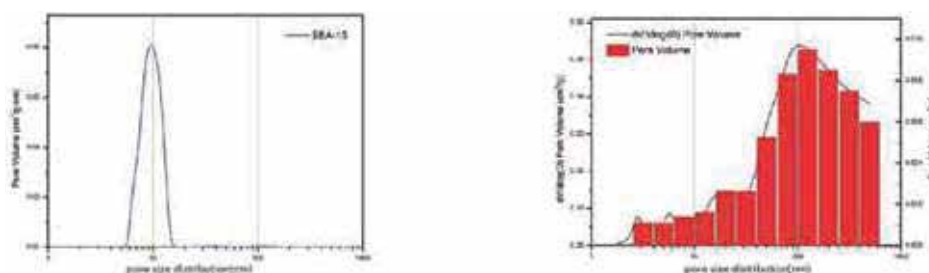


Figure 25. Pore size distribution of silica-based porous material

## Education NMR & MRI Analyzer

ATEduMR 3015V/ AT MinEduMR 3001V



ATEduMR 3015V



AT MinEduMR 3001V

## Configuration

- Magnetic field strength:  $0.5 \pm 0.08\text{T}$
- Probe size: 015mm
- Weight: 1 38kg
- Footprint: -Magnet box: 410 x 450 x 500 mm<sup>3</sup>  
 -Gradient box: 450 x 133 x 410 mm<sup>3</sup>  
 -Electronic box: 450 x 90 x 410 mm<sup>3</sup>

## Configuration

- Magnetic field strength:  $0.5 \pm 0.08\text{T}$
- Probe size: 0 10mm
- Weight: 49.8kg
- Footprint: -Magnet box: 300 X 428 X 302mm<sup>3</sup>  
 -Spectrometer and Gradient box:  
 490 x 250 X 460 mm<sup>3</sup>

The EduMR and miniEduMR are benchtop imaging instruments designed to teach students the principles of magnetic resonance imaging. These transportable instruments can be easily moved from laboratory to laboratory without the need to recalibrate so they can be used in different classrooms or laboratories.

The concepts of k-space imaging, slice selection, signal to noise, image resolution, image acquisition times, data manipulation, filtering, windowing, relaxation, image contrast, and 3D reconstruction are all demonstrable using these instruments.

## Structure

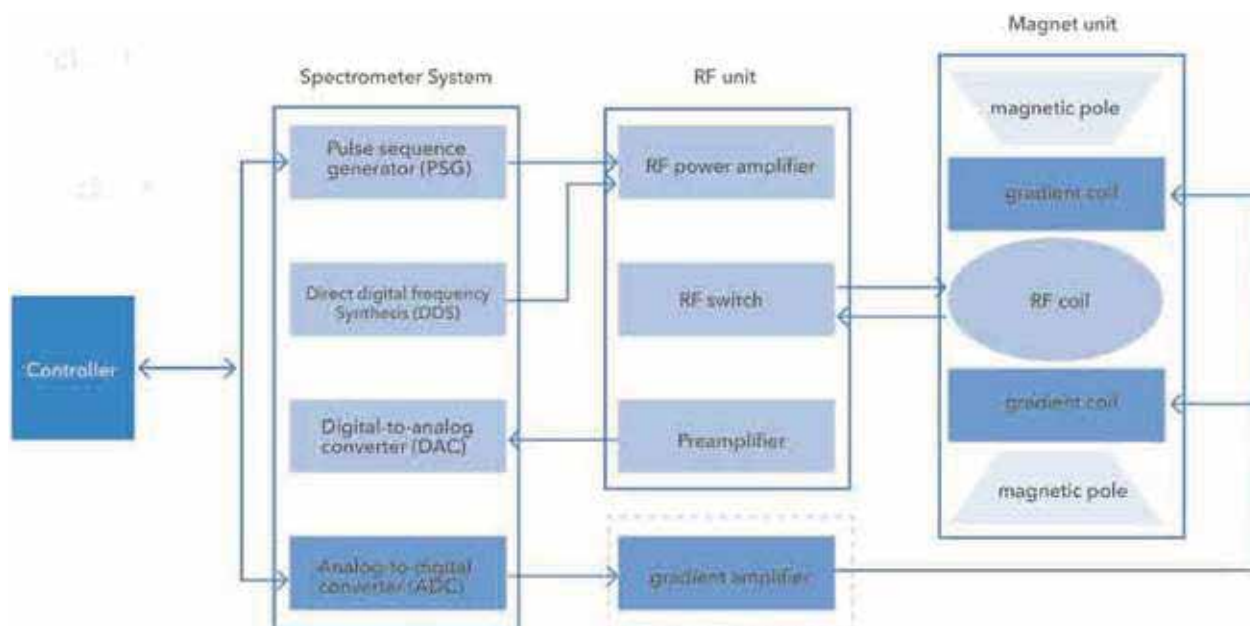


Figure 26. The whole struture of EduMR

## Virtual MRI Data Acquisition and Image Reconstruction Software

### ATEDUNMR

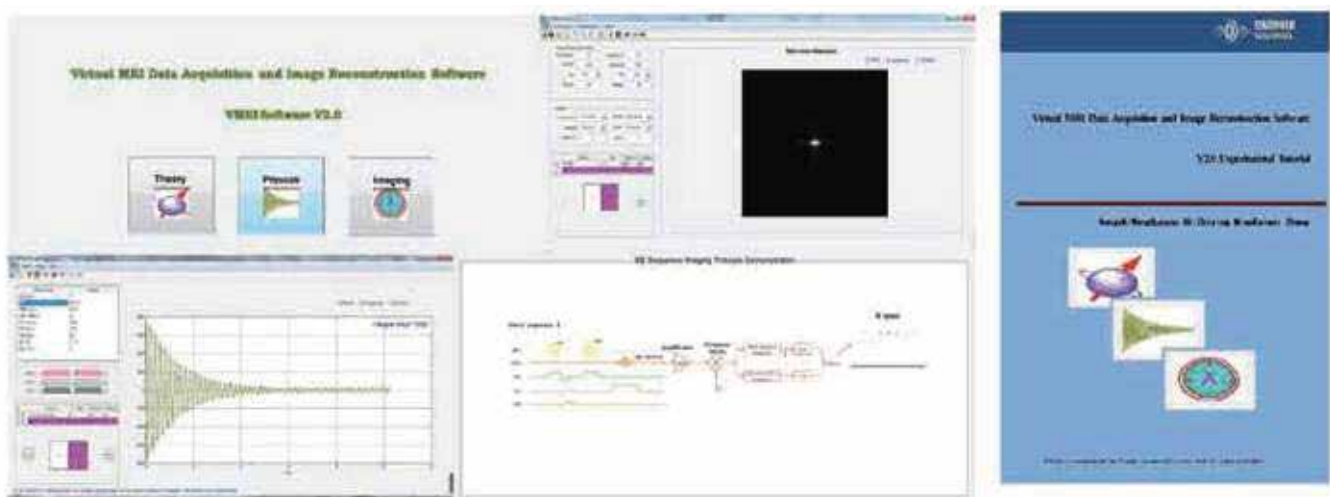
The EDUMR virtual data acquisition and image reconstruction teaching software is a low-field magnetic resonance analyzing and imaging simulation system combining NMR and MRI all in one. By using this virtual NMR signal acquisition and image processing software, we can easily build up a teaching platform, and the realistic teaching of NMR principles and techniques become much more achievable.

The virtual magnetic resonance imaging system can simulate the entire process. With the parameter driven interface users can select imaging sequence, the original level and imaging technology, carry out the relevant data collection. process and perform K space filling of reconstructed images. The use of virtual systems allows many students to learn simultaneously without the need to invest in expensive hardware or several supervisors to train users.

## Advantages

**With the Virtual teething software, users can achieve, but not limited to the Following;**

- ☑ Perform virtual sequence selection parameter adjustment, data acquisition. K space filling, image reconstruction function;
- ☑ The influence of magnetic field inhomogeneity and electronic noise can be stimulated; Minimal investment in hardware is an advantage;
- ☑ Perform fat suppression imaging;
- ☑ Perform water suppression imaging;
- ☑ Perform Bouncepoint imaging;
- ☑ Perform half scanning imaging
- ☑ Overcomes the problem of long time of acquisition through inadequate instrumentation
- ☑ More than four pulse sequences (SE sequence IR sequence, GRE sequence) can be used for virtual imaging data collection
  
- ☑ Observe how the scan parameters affect the image;
- ☑ Minimize the impact of gradient eddy current analog acquisition in severe T2 weighted images
- ☑ Adjust the data acquisition to a normal speed and a fast speed.



Screenshot of ATEDUNMR

## Accessories





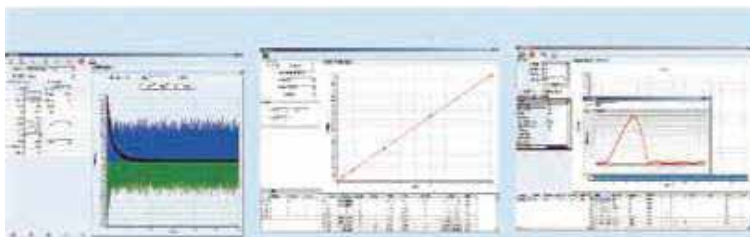
## Software

### General Software

**NMR Analysis software (Ver3.03)**

### Specialized Software

**Core NMR Analysis software(Ver3.0)**

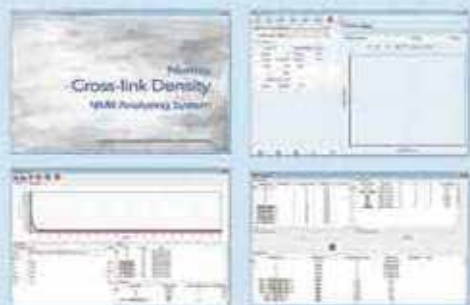


Core NMR Analysis Software is applied in porosity, permeability, saturation measurement of porous media such as cores, concretes which are used for oil exploration analysis. The measuring process is very simple, only including three steps: parameter setting, calibration and measurement.

## Fluid NMR Analysis Software (Ver3.0)



## Cross-link Density NMR Analyzing System (Ver1.0)



The software is designed specially for rubber analysis. It can analyze the cross link density changes which are caused by aging, irradiating or abrading. Compared with conventional equilibrium swelling method, it is faster and more repeatable. Four types of models in the software can satisfy most of the rubber analysis and the software is

## Contrast Agent NMR Relaxation Analysis Software

Contrast Agent Analysis Software is applied for  $T_1/T_2$  and relaxivity test of A. The user interface is designed specially for CA research such as Gd,  $Fe_3O_4$  and soon. very easy to use.

## Solid Fat content NMR Analyzing System (Ver-2.0)



## Spin Finish NMR Analysis Software (Ver-2.0)

The software is designed specially for spin finish test. The operation is very easy and you can grasp the skill very quickly without any special training. There are four main functions; calibration, test, enquiry and parameter setting. You can finish parameter setting, calibration and testing with pushing buttons and export the data you need to excel format very easily.



## Fat & Lean & Fluid NMR Analyzing System Ver-1.0





## HPLC Servicing, Validation, Trainings and Preventive Maintenance :

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Fully Automated CLIA	NOVA Basic Semi -Auto Chemistry Analyzer	PCR/Gradient PCR/ RTPCR	Blood Gas Analyzer	Random access Analyzer for immunoassay Proteins & clinical chemistry	Semen Analyzer	Water purification system

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2. Improving quality of life by offering YOGA Training courses, Work shops/Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXYFY human minds,souls and body by means of yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Camps etc.

## Reach us @



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