

X-CELL Analytical



Petroleum Fluids Analysis



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Analytical Services Lab



Equipment Specification Brochure

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Petroleum Fluids Analysis

(Drilling Fluids, Production Fluids, Fracturing Fluids)

Variables Measured	Equipment Number
Particle Size Analysis	1, 2
pH	1
Emulsion measurement	2
Suspensions measurement	2
Dry powders measurement	2
Surface tension	3, 15
Interfacial tension	3, 15
Density	3, 4
Water content determinations	7, 8
Rheological fluid properties	9, 10
X-ray diffraction analysis	11
Lubricity	12
Percentage of oil and water	13
Flash Point	18
Down Hole conditions simulation	22
Temperature effect on drilling fluids	23
Density of fluids & gases	24

Equipment Information

1



Malvern Zetasizer Nano ZS

- The Zetasizer Nano ZS can perform a combination of three of the most important parameters for the colloid and polymer chemist, **particle size analysis** (Dynamic Light Scattering (DLS)), **zeta potential measurement** (Laser Doppler Electrophoresis), and **molecular weight measurement** (Static Light Scattering (SLS)).
- Size range : 0.6nm to 6 μm
- Size range for Zeta potential : 5nm to 10 μm
- Size range for molecular weight : 1000 to 2×10^7 Daltons
- Instrument options: Narrow band filter (improves the signal for samples that fluoresce at the wavelength of the laser fitted); Universal 'Dip' cell (used to provide repeatable measurements of non-aqueous samples such as solvents); MPT – 2 Autotitrator (used to perform pH, additive, and dilution titrations)

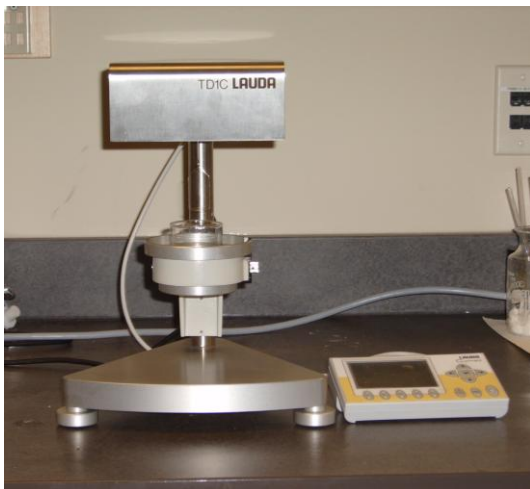
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Malvern Mastersizer 2000

- **Particle size analyzer**
- **Measures emulsions, suspensions and dry powders**
- Measures materials from 0.02 μm to 2000 μm
- Measurement principle: Mie scattering
- **Hydro 2000S (For wet dispersions)**
 - Typical applications include pharmaceuticals, chemicals, food stuffs and emulsions
 - Capacity 50-120 mL
 - **Maximum size of particles up** to 6000 microns dependent on particle shape and density
- **Scirocco 2000 (For dry dispersions)**
 - Typical applications include pharmaceuticals, cement, metal powders, minerals, powder coatings, chemicals and dry ingredients
 - Control of dispersive air pressure to 0.02 bar over a range of 0 – 4 bar
- **Maximum size of particles up** to 2000 microns dependent on particle shape and size

3



Lauda TD 1 C Surface Tensiometer

- **Measurement type : surface and interfacial tension, density, weight**
- Simple selection of measuring methods according to Du Noüy-ring, Wilhelmy-plate, or density measurement
- Measurements surface and interfacial tension
 - $< 300 \text{ mN/m}$ (ring) ; $< 999 \text{ mN/m}$ (plate)
 - Resolution $\pm 0.1 \text{ mN/m}$
- Density Measurement
 - $< 2000 \text{ g/l}$
 - Resolution $\pm 1 \text{ g/l}$
- Weight Measurement
 - $< 5000 \text{ mg}$
- Resolution $\pm 1 \text{ mg}$

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Density Meter (DMA 5000)

- Measuring range: 0 to 3g/cm^3
 - Accuracy
 - Density: 0.000005g/cm^3
 - Temperature: $0.01 \text{ }^\circ\text{C}$
 - Measuring Temperature: 0°C to 90°C (32 to $194 \text{ }^\circ\text{F}$)
 - Pressure range: 0 to 10 bar (0 to 145 psi)
 - Minimum amount of sample: 1 mL
- Applications: Fine chemicals, Biodiesel, Bioethanol, Sea water, Crude oil, Fuel, Lubricants, Coatings, Beer and wort, Juice, Soft drinks, Spirits, and Wine.

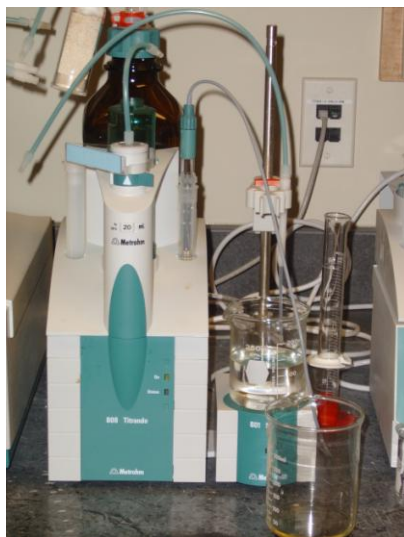
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787 KF Titrino

- With 703 Ti Stand
- Contains the four most important **titration methods**:
 - Titer determination with water or water standard
 - Titer determination with sodium tartrate
 - Blank determination
 - Karl Fischer titration- KFT
- Direct **water content determinations** in
 - Liquids
 - Solids
 - Gases
 - Viscous materials
- Range of water contents: 100 ppm-100%
- Range of start volume: 0-99.99mL

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808 Titrande

- **Titrator** with built-in buret drive, one or two galvanically separated measuring interfaces with one high-impedance and one polarizable measuring input, measuring input for temperature sensor.
- Measuring ranges:
 - Potentiometric : -2000mV- +2000mV
 - pH: -20.00- +20.00
 - Amperometric: -2000mV- +2000mV
 - Voltametric: -200µA- +200µA
- Resolution:
 - Voltage: 0.1mV
 - pH value: 0.001pH
 - Current: 0.01uA
 - Temperature: 0.1°C
- Measuring Accuracy:
 - Voltage: ± 0.2mV
 - pH value: ± 0.003pH
 - Temperature: ± 0.2°C
- With 801Stirrer: Magnetic stirrer for use with the titrande.
 - Applications:
 - Determining the **water content** in biodiesel by Karl Fischer titration.
 - Titration analyses of biofuels
 - Automated Karl Fischer titration for liquid samples
- Maximum speed: 1700-1900 min⁻¹

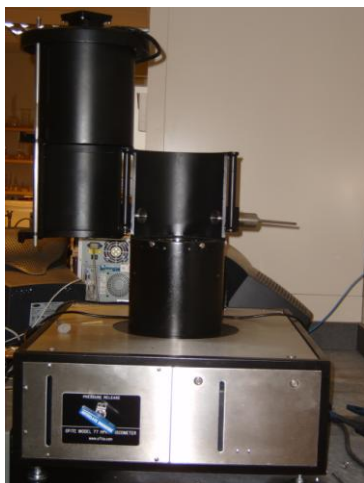
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OFITE Model 900 Viscometer

- Sometimes referred to as a V-G meter or a **rheometer**, is used to **measure fluid flow properties**.
- Analysis of food grade materials, suspensions, solutions, polymer systems
- Analyzes drilling fluids and completion fluids.
- Shear Rate Range (sec^{-1}): 0.01-1700
- Shear Stress Range(dynes/cm^2): 0-1700

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OFITE HTHP Viscometer

- This fully-automated system accurately determines the **rheological properties** of completion fluids and drilling fluids in terms of shear stress, shear rate, time, and temperature at pressures up to 20,000 psi and temperatures up to 450°F.
- Motor Speeds (rpm) - Variable speed range 10-600
- Shear Rate Range (sec^{-1}) - 1-1022
- Viscosity Range - 0-300 centipoise at 300 rpm

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PANalytical X-ray Diffractometer

- The X'Pert PRO MPD is a multi-purpose X-ray diffraction system.
- Complete X-ray powder diffractometer for the analysis of: pharmaceutical substances, engineered components, coatings, clay minerals, glass, polymer foils, metals, chemicals, and zeolites, forensics.
- Routine autosampling phase analysis, microdiffraction (small spot size analysis), variable temperature and humidity experiments and insitu measurements of phase changes related from a reaction chamber.
- **Enclosed Console and X-ray tubes**
- **Goniometer System**
- **15 Position Autoloader and Spinner**

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OFITE Lubricity Tester

- EP-**Lubricity** Tester, 115 Volt, 60 Hz, OFITE Digital
- Measures the lubrication properties of drilling fluids and other fluid systems.
- Simulates the speed of rotation of the drill pipe and the pressure with which the pipe bears against the wall of the hole.

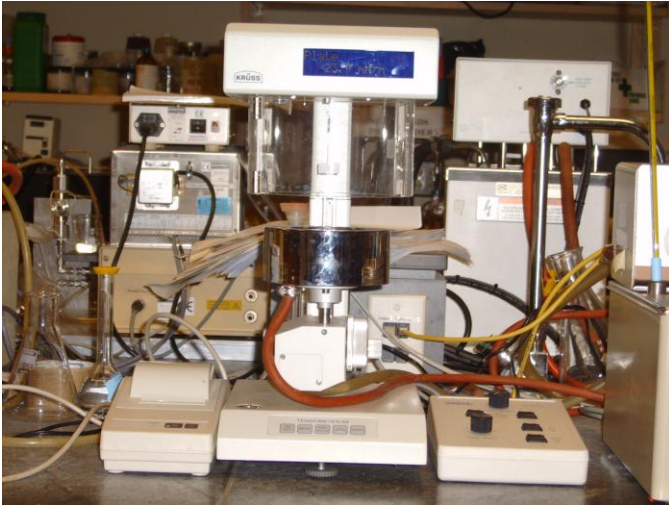
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OFITE Retort

- 50mL Retort with Digital Temperature Controller, 115V
- Measures the **percentage of oil and water, and estimates both suspended and dissolved solids** contained in a sample of water-based or oil-based muds and cuttings.

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Kruss Tensiometer K9

- Measures **surface tension and interfacial tension** using ring and plate method
- Can also be used for measuring at controlled temperatures
- Measuring range (SFT/IFT): 1-999 mN/m
- Resolution: 0.1 mN/m
- Measuring range (Density): 1-2200 kg/m³
- Resolution: 1 kg/m³
- Measuring rate: 2 readings/sec
- Weighing range: 50g
- Temperature range: -10 to 100°C
- Display resolution: 0.1°C

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K16200 Pensky-Martens Closed Cup Flash Tester

- Determines **flash points** of a wide range of products by a closed cup method with two option speed stirring of the sample.
- Used in shipping and safety regulations for detection of contamination by volatile and flammable materials in fuel oils and lubricating oils, and for characterization of hazardous waste samples.
- Electrically heated model with a 750W nickel-chromium heater with stepless variable control for accurate, repeatable temperature rate of rise settings per specifications.

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Baroid HPHT Filter Press

- Designed specifically for simulating down-hole conditions
- 175mL, 1500psi, 115 volt, 400watt

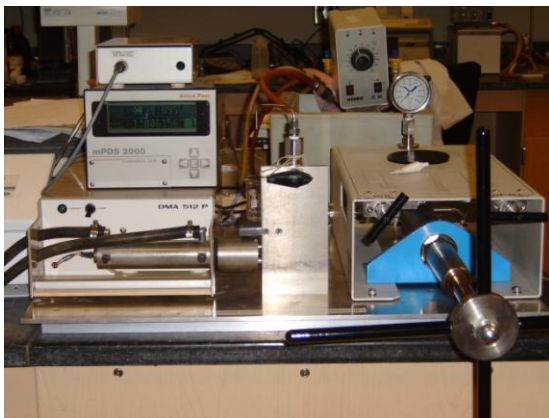
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OFITE 5 Roller Oven

- Capacity: 16 Each-260 ml Aging Cells, 115 Volt
- Is an effective aid in **determining the effects temperature has on drilling fluid** as it circulates through the wellbore. Aging the drilling fluid in pressurized containers effectively demonstrates the thermal effects on viscosity and how various additives behave at elevated temperatures.

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DMA 512P

- Measures the **density of liquids and gases** under high pressures and high temperatures.
- Pressure range for continuous operation is 0 to 700 bar (10,000 psi), the temperature range is -10°C to +150°C (+14°F to +302°F)
- Uncertainty in density measurement: $1 \times 10^{-3} \text{g/cm}^3$
- Temperature range: -10°C to +150°C
- Pressure range: 0 to 700bar
- Volume of the measuring cell: approx. 1mL
- Applications
 - Geological fluids;
 - Oil and gas fluids;
 - Lubricants;
 - Biodiesels.