

X-CELL Analytical



Biofuels Analysis



St. Francis Xavier University
Analytical Services Lab



Equipment Specification Brochure

Physical Sciences Center
PO Box 5000
Antigonish, NS, B2G 2W5
Canada

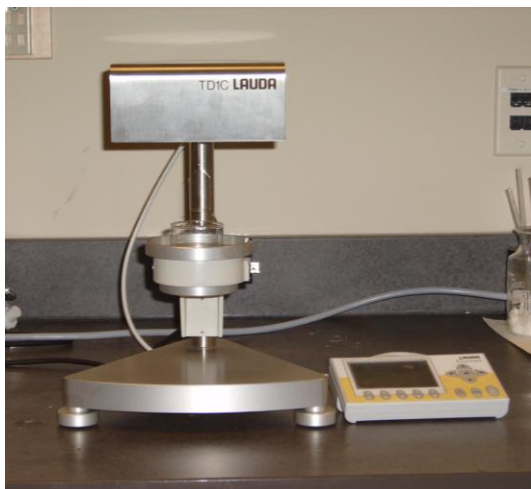
Phone: 902-867-2324
Fax: 902-867-2414
E-mail: gmarango@stfx.ca

Biofuels Analysis

Variables Measured	Equipment Number
Density	3, 4
p-Anisidine value	5
Peroxide value	5, 7
Concentration of soaps	5, 7
Oxidation stability of oils and fats	6
Water content determinations	7, 8
Titration analysis	7, 8
Percentage of oil and water	13
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Equipment Information

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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: $0 \text{ to } 3 \text{ g/cm}^3$
- Accuracy
 - Density: 0.000005 g/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: $0 \text{ to } 10 \text{ bar}$ ($0 \text{ to } 145 \text{ psi}$)
- 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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FoodLabFat

- Measures the **percentage of acidity**, the **amount of peroxides**, the **concentration of p-Anisidine** (AnV) and **soaps** in seed oils, dry fruit, essential oils, butter, cream, and edible fats and oils.
- 6 channel photometer designed to heat the samples at a temperature of 37°C.
- Environmental operating specifications: the system and its components can be used in environments with a temperature ranging from 15°C to 35°C and a relative humidity from 20% to 90% , non condensing.
- Photometric range: 0.0-2.3 Abs

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743 Rancimat

- For the determination of the **oxidation stability** of oils and fats, also referred to as Oil Stability Index (OSI).
- 8 sample positions, 2 separate heating blocks and a software solution for controlling methods, samples and data
- **Applications:**
 - Vegetable fats/oils: soy, sunflower, corn, canola, coconut, peanut, palm, etc
 - Animal fats/oils: butter, fish oil, lard, etc.
 - Fat- or oil-containing products:
 - Direct measurements: margarine
 - After fat extraction: cereals, biscuits, cookies, nuts, bacon, sausages, meat, etc.
 - Antioxidant research
 - Oxidative stability of biodiesel and FAME (fatty acid methyl ester)
- Oxidation stability of light heating oil with Cu catalyst

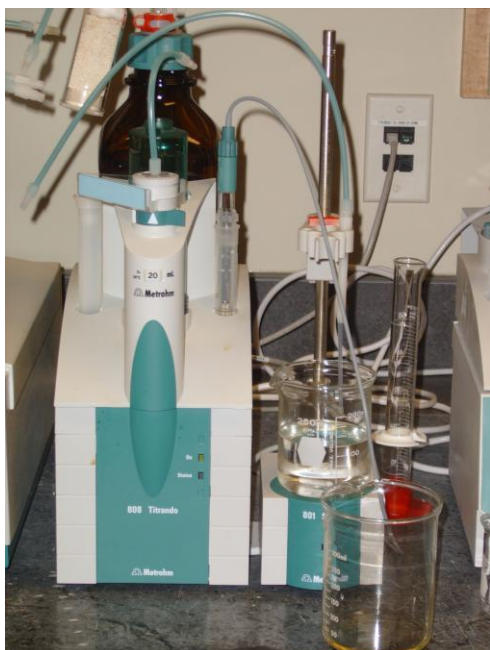
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787 KF Titrino

- 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: -200 μ A- +200 μ A
- Resolution:
 - Voltage: 0.1mV
 - pH value: 0.001pH
 - Current: 0.01uA
 - Temperature: 0.1°C
- Measuring Accuracy:
 - Voltage: \pm 0.2mV
 - pH value: \pm 0.003pH
 - Temperature: \pm 0.2°C
- With 801Stirrer: Magnetic stirrer for use with the titrando.
 - 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 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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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.



Hewlett Packard 5890 Series II Gas Chromatograph

- SRI Peak Simple **Chromatography** Data System Model 333
- Column Oven:
 - Operating range: 4°C above ambient to 450°C
 - Setpoint entry: 1°C for temperatures, 0.1°C for program rates
 - Programming: rates 0.1 to 70°C per min, 650minutes maximum run time, three ramps with initial/ final holds
- Thermal conductivity detector (TCD):
 - Range to 400°C
- Flame ionization detector(FID):
 - Range to 450°C
 - Grounded jet and current limited design for operator safety
 - Push-button flame ignition
- Inlet systems:
 - 5890 PI (Packed Inlet)
 - 5890 Split/ Splitless Inlet with EPC (Series II with #039 only)
 - 5890 Series II dual injectors (split/ splitless or packed) dual FID/TCD detectors
- Primary applications: analysis of herbicides, pesticides, biodiesels, many organic reaction products.

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Antek^(R) Model 9000V LLS Low Level Sulfur Analyzer

- Performs total sulfur analyses in LPGs (Liquefied petroleum gases) and syringeable liquids, including light viscous materials.
- Patented Pyro-fluorescence™ sulfur technology
- Enables unprecedented UVF (ultraviolet fluorescence) sensitivity
 - Allows for sulfur analysis at the ppb level.
 - Fast, precise measurement of liquid and gas samples
 - Superior to wet chemistry and other instrumental methods
 - No environmentally hazardous catalysts or reagents
- Utilizes ASTM D5453 methodology, which is accepted by the California Air Resources Board (CARB) for low level sulfur analysis in Phase 2 Reformulated Gasoline.
- European Union scientists (Workgroup 27) established this UVF technology as the method of choice for low (<10pg/kg) sulfur in motor fuels.
- Modular design of detectors and electronics.
- Single- or multi-point calibration curves.
- Post-analysis reprocessing including the ability to recalculate data with different calibration curves.
- Ability to plot 1st, 2nd and 3rd order regression curves.
- Analytical Range
 - Low ppb to 50 ppm
- Precision
 - ± 30 ppb or $\pm 2\%$ RSD, whichever is greater
- Typical Sample Size
 - Gas: 5 to 15 mL
 - LPG: < 15 □ L
 - Liquid: 1 to 20 □ L
- Typical Analysis Time
 - Less than five minutes
- Temperatures
 - Combustion zone: ambient to 1100°C in 1°C increments
- The 9000 S (sulfur) system may be upgraded to a 9000 NS (nitrogen/sulfur) system at any time.
- Antek Model 735E Controlled Rate Sample Drive
 - Provides precise, reproducible sample introduction into Antek elemental analyzers by either syringe or sample boat.

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Cloud point



LAWLER Automated Cold Filter Plugging Point and Cloud Point Analyzer Model OL-14-2/ DR-2L

- One automated Cold Filter Plugging Point (CFPP) analyzer and one Cloud Point (CP) analyzer
- Fully conforming to the ASTM D6371 and ASTM D2500 manual test methods.
- Capable of automatically determining the CFPP and CP of most fuel and oil specimens.
- RTD temperature probes are located in the same position as prescribed by the respective methods.
- Directly refrigerated cooling
- Avoids the use of the alcohol cryostat by directly cooling the test jacket with refrigerant.
- Only ozone friendly, chlorine-free refrigerants are used.
- Capable of test jacket temperatures of -34°C, -51°C, and -67°C as per ASTM D6371 and 0°C, -18°C, -33°C, -51°C, and -69°C as per ASTM D2500
- Touch panel display working with microprocessor (PLC) based software
- Software interprets all key parameters such as sample temperature, bath (jacket) temperature, cloud visibility, etc. and reports the test results on the display screen.

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SRI 8610C Gas Chromatograph

- The SRI BioDiesel GC System is configured to perform ASTM 6584 (residual free and bound Glycerin in Bio Fuel).
- Analysis takes about 25 minutes.
- Model 8610C chassis
- Ambient to 400°C column oven
- On-column injector with carrier EPC (Electronic Pressure Controller)
 - Simple and Reproducible
 - For liquids and gases with low and high boiling analytes
 - No boiling point discrimination
 - Low thermal mass
- FID Detector
 - Hydrocarbon selective
 - Robust, linear, stable
 - Detects down to 1 ppm
 - Unique Ceramic Ignitor can run HOT continuously to keep flame lit
- 15M x 0.53mm I.D. 0.15u Biodiesel Type MXT-500 Metal Capillary Column
- Single channel PeakSimple data system
- “at-a-glance” display of temperatures, pressures, voltages, and detector parameters

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Beckman J-6B Centrifuge

- Floor Model, refrigerated centrifuge
- Modified for determining the volume of free water and sediment in middle distillate fuels in accordance with ASTM D2709.
- Designed to operate at approximately 1600 rpm (giving a relative centrifugal force of approximately 80).
- Centrifuge head (able to withstand a force of approximately 2000 rpm) with four holders designed specifically for custom made 100 mL graduated tubes
- Easy to operate
 - Speed dial, analogue display meters for rotor speed and temperature, timer (up to 30 minutes in one minute increments), braking system, start and stop buttons
- Adjustable over temp shutdown
- Accessories:
 - 100 mL centrifuge tubes (readable to 0.005 mL and measurable to 0.01 mL), centrifuge tube holder

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Lawler Model 279-4 Copper Corrosion Liquid Bath

- A heated liquid stainless steel bath designed to run ASTM D130 and also suitable for ASTM D1838
- The temperature range is 40° to +180°C with temperature stability of $\pm 0.2^\circ\text{C}$.
- Temperature is controlled with a digital display controller with 0.1°C resolution. Over temperature controller
- The bath is agitated with a bath circulation pump for bath uniformity.
- 8 test tube ports, 4 pressure vessel ports
- Accessories:
 - Test tubes, stainless steel pressure vessels (test bombs), copper strips, ASTM copper corrosion standard, viewing test tube, polishing vise, metal test tube and test bomb holders

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Carbon Residue

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Cold Soaked Filterability