

FOR MORE INFORMATION

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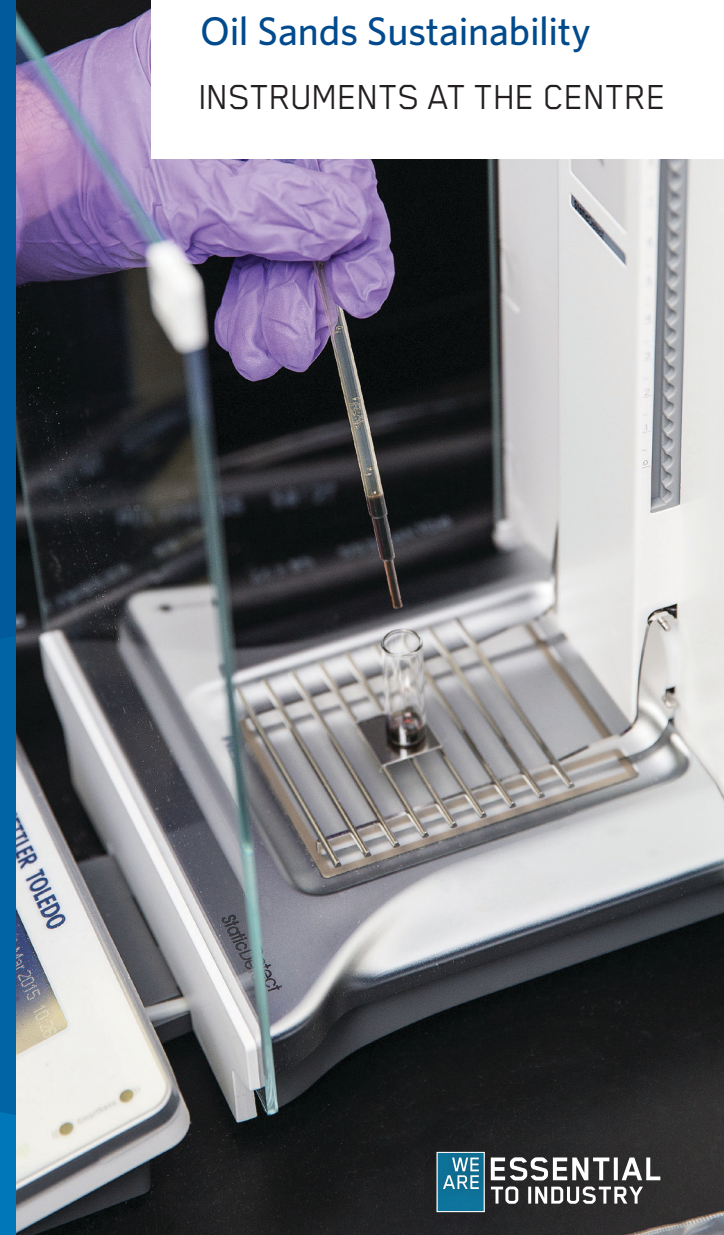
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COMMITTED TO STUDENT SUCCESS
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Centre for Oil Sands Sustainability

INSTRUMENTS AT THE CENTRE



WE
ARE
ESSENTIAL
TO INDUSTRY

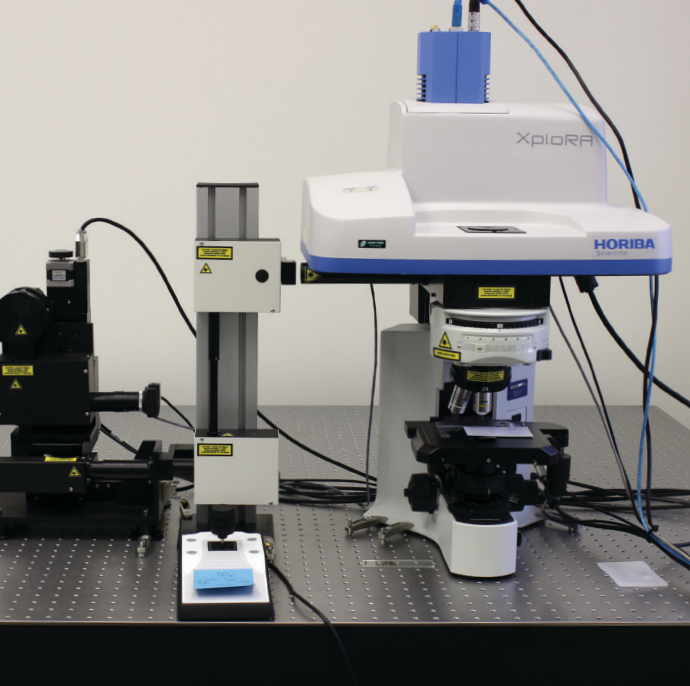
WHO WE ARE

NAIT's Centre for Oil Sands Sustainability works with the oil sands industry to address industry challenges in the areas of tailings treatment, water management, greenhouse gas emission reduction, extraction and measurement instrumentation and monitoring. Through its partnership with small and medium enterprises and other innovators, the centre is dedicated to developing breakthrough solutions, which demonstrate environmental responsibility, cost-effective oil sands development and cleaner energy production.

WHAT WE DO

The Centre for Oil Sands Sustainability bridges the gap between existing oil sands environmental research and real-world solutions, taking innovative ideas from bench to commercialization. We work with business and industry to develop technologies that improve the economic and environmental performance of the oil sands industry.

We also work with businesses and innovators by assisting in the validation of near-market-ready technologies that relate to challenges and opportunities in the oil sands industry.



MATRIX-ASSISTED LASER DESORPTION/IONIZATION TIME-OF-FLIGHT MASS SPECTROMETER (MALDI-TOF-MS)

- **Purpose:**
 - Characterization of polymer and copolymer molecular weight distributions
 - Composition and deconvolution of homopolymer and copolymer mixtures, and
 - Hydrocarbon analysis quantification and characterization
- **Application:** Qualitative and quantitative analysis of polymer additives without sample pretreatment, analysis of crude oil and asphaltenes

ATOMIC FORCE MICROSCOPE – RAMAN (AFM-RAMAN)

- **Purpose:** High resolution (nm) structural and topographic imaging (AFM) coupled with molecular information (Raman)
- **Application:** Materials research, including nanoparticles, graphene, polymers, composites, semiconductors, flocculated clays and membranes

AVANTI J-26XP CENTRIFUGE

- **Purpose:** Separation of solids from bitumen

THERMAL GRAVIMETRIC ANALYZER (TGA)

- **Purpose:** Thermal analysis to determine changes in physical and chemical properties of materials with temperature (decomposition, degradation, thermal stability, oxidation, combustion)
- **Application:** Characterization of thermal behavior of polymeric flocculants and polymer-clays composites

PARTICLE SIZE ANALYZER

- **Purpose:** Particle size distribution of solids or emulsion solutions
- **Application:** Fines measurement in oil sand ores and slurries

METRO CARBON RESIDUE ANALYZER (MCR)

- **Purpose:** Characterization of coke formation
- **Application:** Coking behaviour of bitumen

UV-VIS SPECTROPHOTOMETER

- **Purpose:** Characterization and quantification of material composition

- **Application:** Determination of methylene blue index (MBI) values for oils sands clays
- **Features:** Transmission via quartz cell or fibre optics

BRUKER 450 GAS CHROMATOGRAPH

- **Purpose:** High temperature simulated distillation
- **Application:** Characterization of naphthenic acids in oil sands wastewaters and characterization of crude oil and bitumen

BRUKER FOURIER TRANSFORM INFRARED SPECTROMETER (FTIR)

- **Purpose:** Chemical characterization of materials
- **Application:** Screening of oil sands naphthenic acids and studying the effect of bitumen modification and aggregate bitumen interaction
- **Features:** Attenuated total reflectance and diffused reflectance cells for organic compounds, films and powders

ANTON PAAR SVM 3000 VISCOMETER

- **Purpose:** Determination of dynamic viscosity and density of fluids
- **Application:** Characterization of oils
- **Features:** 48-position auto- sampler

TOTAL ORGANIC CARBON ANALYZER (TOC)

- **Purpose:** Determination of carbon content
- **Application:** Carbon content in produced water from oil sands operations
- **Features:** Extremely wide measurement range from 4 mg/L to 30,000 mg/L. Applicable to ultrapure water to highly contaminated water

BRUKER VARIAN 3900 GAS CHROMATOGRAPH

- **Purpose:** Analysis of low boiling point range sample constituents
- **Application:** Characterization of oils
- **Features:** Equipped with a split/splitless injector and RID

BROOKFIELD VISCOMETER DV-II+ PRO

- **Purpose:** Analysis of fluids' viscosity at given shear rates
- **Application:** Characterization of crude oil or oil sands tailings

X-RAY DIFFRACTOMETER (XRD)

- **Purpose:** Mineral characterization
- **Application:** Determination of clay composition for oil sands ores and tailings
- **Features:** Reflectometry, high-resolution diffraction, in-plane grazing incidence diffraction (IP-GID), small angle X-ray scattering (SAXS), residual stress and texture investigations

WAVELENGTH DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER (XRF)

- **Purpose:** Elemental analysis
- **Application:** Inorganic elemental analysis in oil sand ores and tailings
- **Features:** Elemental analysis (Beryllium to Uranium) of a wide variety of oil sands type samples

ULTRA HIGH PERFORMANCE LIQUID CHROMATOGRAPH WITH QUADRUPOLE TIME-OF- FLIGHT MASS SPECTROMETER (HPLC-Q-TOF-MS)

- **Purpose:** Identification and quantification of materials ranging in size from small molecules to antibodies
- **Application:** Characterization of complex naphthenic acid mixtures