The lab is also equipped to conduct core sample characterization to determine porosity and permeability.

The residual oil saturation and water saturation at various stages of the displacement process can be measured at ambient or reservoir condition in core flow experiments.

In order to test the properties and trapping efficiency of these nanoparticles, a range of analytical chemistry instruments are used. Zeta PALS and FOQELS laser light scattering (Brookhaven Instruments) are used for particle size analysis and zeta potential determination. Inductively coupled plasma—atomic emission spectroscopy (Perkin Elmer) is a valuable tool for determining the metallic composition of a sample, providing quantitative information at very low concentrations (ppb) for a wide range of metals.

The total organic carbon/total nitrogen analyzer (Teledyne Tekmar) can be used to determine the total nitrogen, total carbon, total inorganic carbon, and total organic carbon at concentrations between 50 ppb and 30,000ppm, thus enabling us to determine the polymer content of a sample.

The ability to flood sandpacks under both aerobic and anaerobic conditions with these nanoparticles allows us to evaluate the efficacy of these nanoparticles in a controlled environment and without leaving our laboratories.

Flow Assurance

A dynamic flow loop (Figure 3) has been set up to simulate wax deposition in a production string under different production scenarios. Data from this experimental setup can be used to understand better how wax deposition thickness depends on the composition of oil, temperature, velocity of fluid, and pressure. Samples obtained using this set-up have been analyzed for wax composition using the gas chromatograph (Varian).