



Fractionation of Crude Oil Components

On a Gilson Semi-Preparative HPLC System

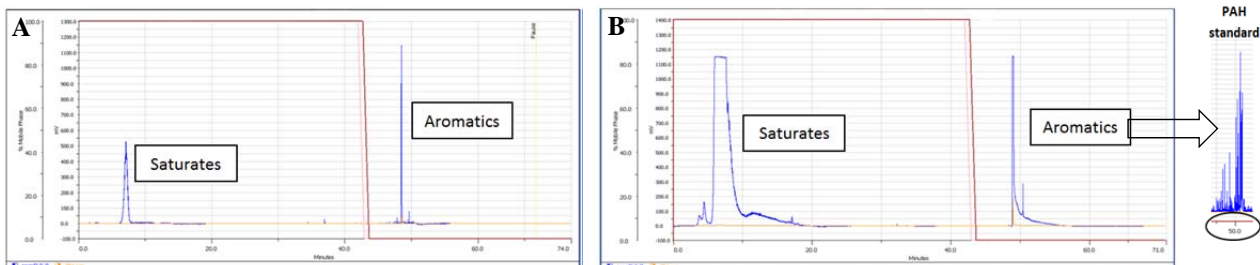


Figure 1. Separation of aromatic and saturated compounds was observed for both light- (A) and dark- (B) colored oil samples prepared in hexane. The retention time for aromatic compounds was confirmed by running a PAH (polycyclic aromatic hydrocarbon) standard under the same conditions, which produced a signal at approximately 50 minutes.

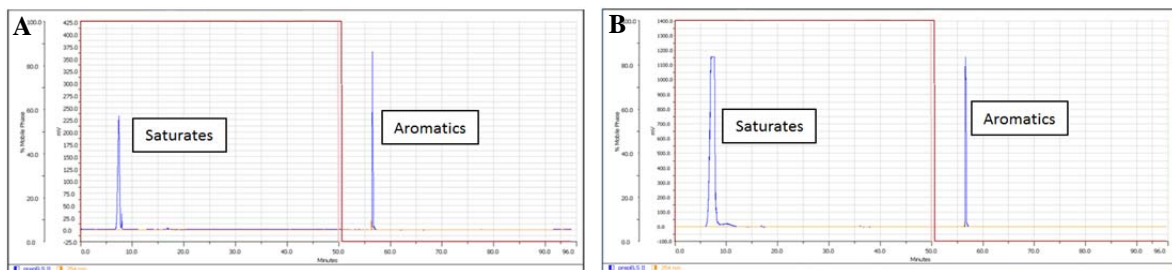


Figure 2. Samples were prepared in a solvent containing hexane:DCM:MeOH (1:1:1), and HPLC run time was increased. The resin fraction was not visible, but peak shapes appeared to improve under these conditions.

As the field of petrochemistry expands, so does the need for a method that effectively separates components of crude oil, enabling their identification and analysis. Crude oil, or petroleum, is composed primarily of hydrocarbons, which are separated based largely on their solubility and polarity. The common method for separating such compounds is SARA fractionation, dividing oil into four classes: **Saturates**, **Aromatics**, **Resins**, and **Asphaltenes**. Following precipitation of the insoluble asphaltene fraction, a Gilson semi-preparative HPLC system was able to adequately separate the saturated and aromatic compounds from two crude oil samples (Figure 1). The highly polar resin fraction did not appear to elute, however, as no corresponding peaks were detectable in either the ELSD or UV spectra. In an effort to elute and detect the resins, samples were prepared in a more polar solvent and run again for an extended length of time (Figure 2), yet despite the altered conditions, the polar compounds were not visible. Further alterations to the run time or solvent composition, as well as use of a different column, may be necessary to resolve these resins in future HPLC separations.

Gilson Semi-Preparative HPLC System

- GX-281 Liquid Handler
- Direct Injection Module
 - 100 μ L total sample loop injection
- 321 Pumping System with H2 Pump Heads
- 152 UV/VIS Detector
 - 254 nm; sensitivity of 0.01
- PrepELSTMII (Evaporative Light Scattering) Detector
 - Drift tube: 25°C
 - Spray chamber: 0°C
 - Full-scale setting: 5 V
 - Nitrogen flow: 50 psi
- VALVEMATE® II
 - 2 positions; 6 port valve
- Phenomenex Security Guard Semi-Prep Cartridge (10 x 10 mm) with a 0.20 μ m in-line filter
- Whatman Partisil Silica 10 μ m column (9.4 x 500 mm)
- Solvents for sample preparation:
 - Hexane (Figure 1) and hexane:dichloromethane (DCM): methanol (1:1:1) (Figure 2)

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