

# SUPPORTING INFORMATION

## Probing Aggregation Tendencies in Asphaltenes by Gel Permeation Chromatography. Part 1: Online Inductively Coupled Plasma Mass Spectrometry and Offline Fourier Transform Ion Cyclotron Resonance Mass Spectrometry

**Jonathan C. Putman<sup>1,2,3</sup>, Rémi Moulian<sup>4,5,6</sup>, Caroline Barrère-Mangote<sup>4,5</sup>, Ryan P. Rodgers<sup>1,2,4,6,7</sup>, Brice Bouyssiére<sup>4,5,6,\*</sup>, Pierre Giusti<sup>4,5</sup>, Alan G. Marshall<sup>1,2,\*</sup>**

<sup>1</sup> National High Magnetic Field Laboratory, Florida State University, 1800 East Paul Dirac Drive, Tallahassee, FL 32310

<sup>2</sup> Department of Chemistry and Biochemistry, 95 Chieftain Way, Florida State University, Tallahassee, FL 32306

<sup>3</sup> Exum Instruments, 973 W. Ellsworth Ave., Denver, CO 80223

<sup>4</sup> International Joint Laboratory – iC2MC: Complex Matrices Molecular Characterization, TRTG, BP 27, 76700 Harfleur, France

<sup>5</sup> TOTAL Raffinage Chimie, TRTG, BP 27, 76700 Harfleur, France

<sup>6</sup> Universite de Pau et des Pays de l'Adour, E2S UPPA, CNRS, IPREM , Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Materiaux, UMR5254, Hélioparc, 64053 Pau, France

<sup>7</sup> Future Fuels Institute, Florida State University, 1800 East Paul Dirac Drive, Tallahassee, FL 32310

### Corresponding Author:

Tel: +1-850-644-0529

Fax: +1-850-644-1366

[marshall@magnet.fsu.edu](mailto:marshall@magnet.fsu.edu)

Tel :+33(0) 559 407 752

Fax : +33(0) 559 407 781

[Brice.bouyssiere@univ-pau.fr](mailto:Brice.bouyssiere@univ-pau.fr)

**Table S1.** Average and %RSD for the normalized mass recovery from the purified asphaltene sample with THF as diluent and mobile phase (n=3).

Fraction	Mass Recovery (%)
High M.W.	70.1 ± 1.9
Medium M.W.	35.4 ± 9.6
Low M.W.	12.7 ± 0.3
Tailing	3.7 ± 0.8
Total	92.6 ± 0.8

## ■ FIGURE LEGENDS

**Figure S1.** Heteroatom class distributions from (+) APPI 9.4 T FT-ICR mass spectral analysis for the PetroPhase 2017 purified asphaltenes and its corresponding GPC fractions. The heteroatom classes represent the most abundant heteroatom classes for the GPC fractions.

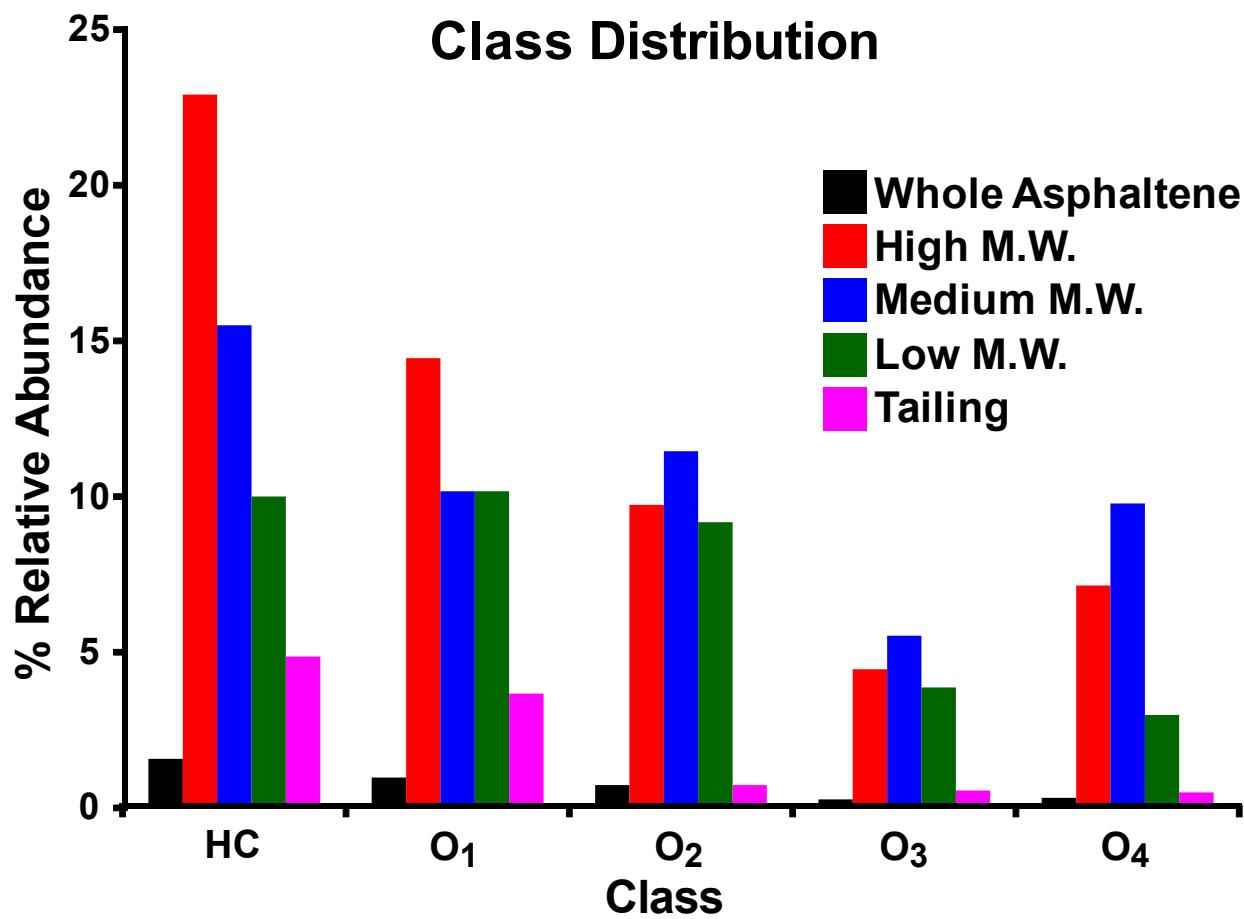
**Figure S2.** Positive ion APPI-derived isoabundance-contoured plots of double bond equivalents vs. carbon number for the HC (top), O<sub>1</sub> (middle) and O<sub>2</sub> (bottom) heteroatom classes which were most abundant in the high M.W. GPC aggregate fraction.

**Figure S3.** Heteroatom class distributions from (+) APPI 9.4 T FT-ICR mass spectral analysis of the whole Arabian crude oil and its corresponding GPC fractions.

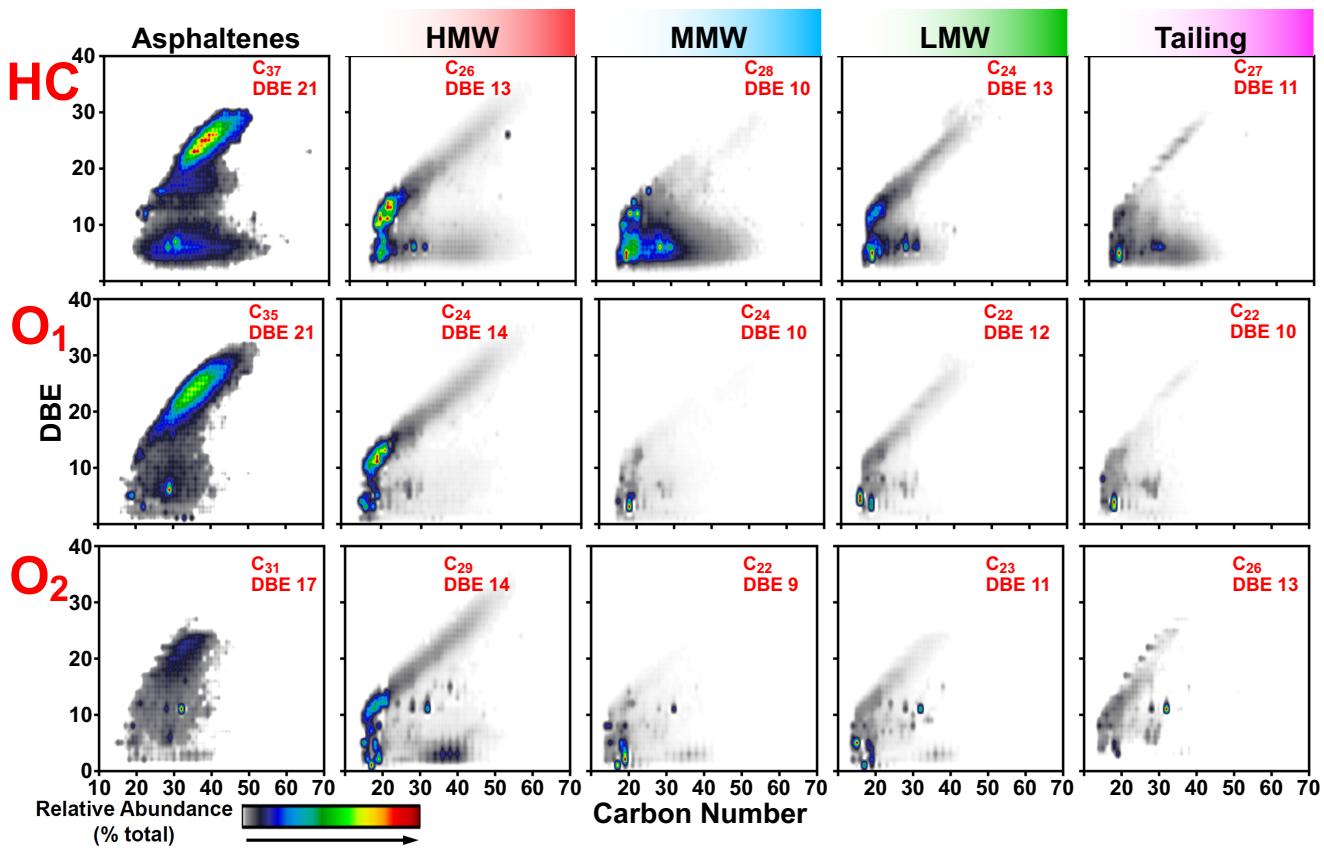
**Figure S4.** Isoabundance contoured plots of double bond equivalents vs. carbon number derived from (+) APPI analysis of the whole crude oil and its GPC aggregate fractions. The heteroatom classes HC, S<sub>1</sub>, S<sub>2</sub>, and O<sub>1</sub>S<sub>1</sub> are displayed from top to bottom. The red dashed lines represent the polycyclic aromatic hydrocarbon planar limit.

**Figure S5.** Zoom insets of two mass segments from the broadband mass spectra of the purified asphaltene and its GPC fractions.

**Figure S6.** Average H/C ratios for the heteroatom class groups from the parent whole crude oil and its corresponding GPC aggregate fractions.

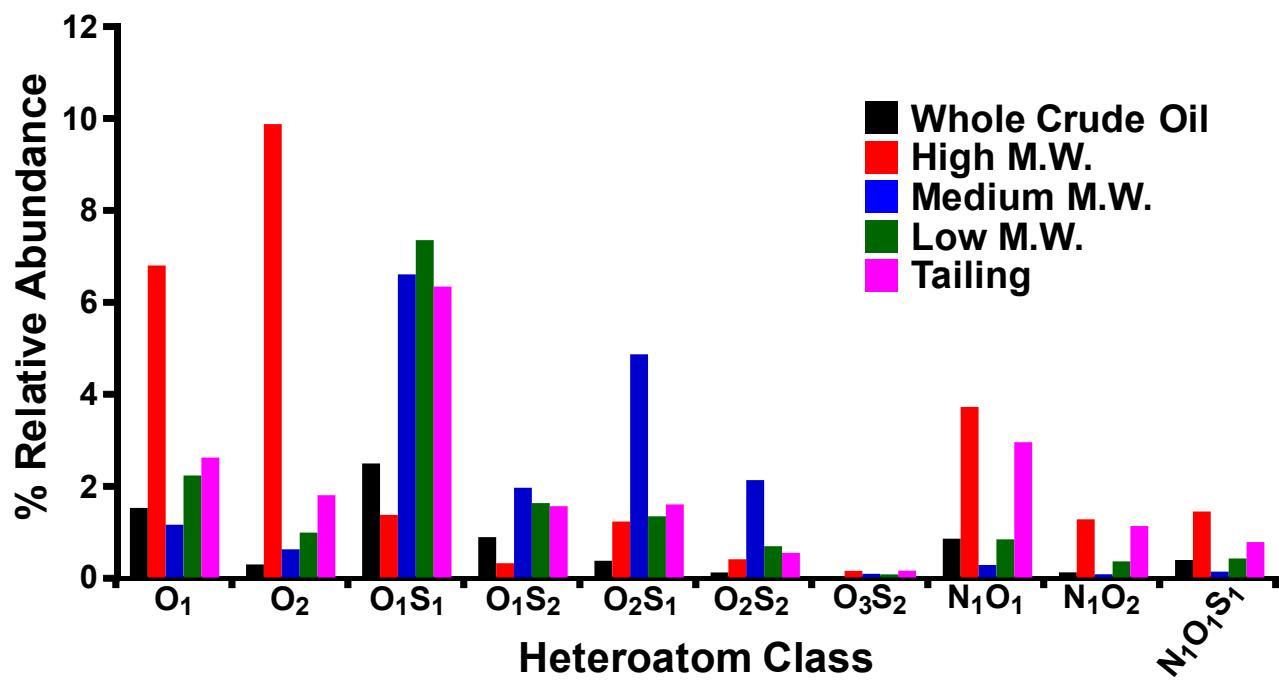
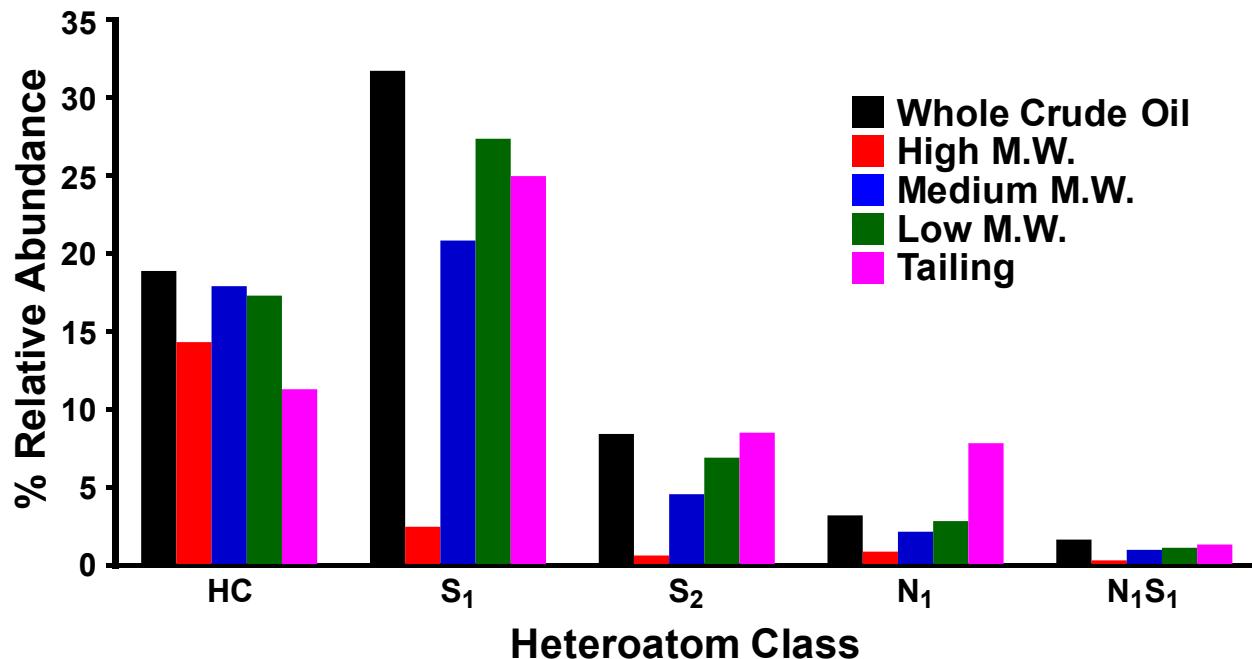


**Figure S1.** HC and Oxygenated (O<sub>1-4</sub>) class distributions from (+) APPI 9.4 T FT-ICR mass spectral analysis for the PetroPhase 2017 purified asphaltenes and its corresponding GPC fractions.

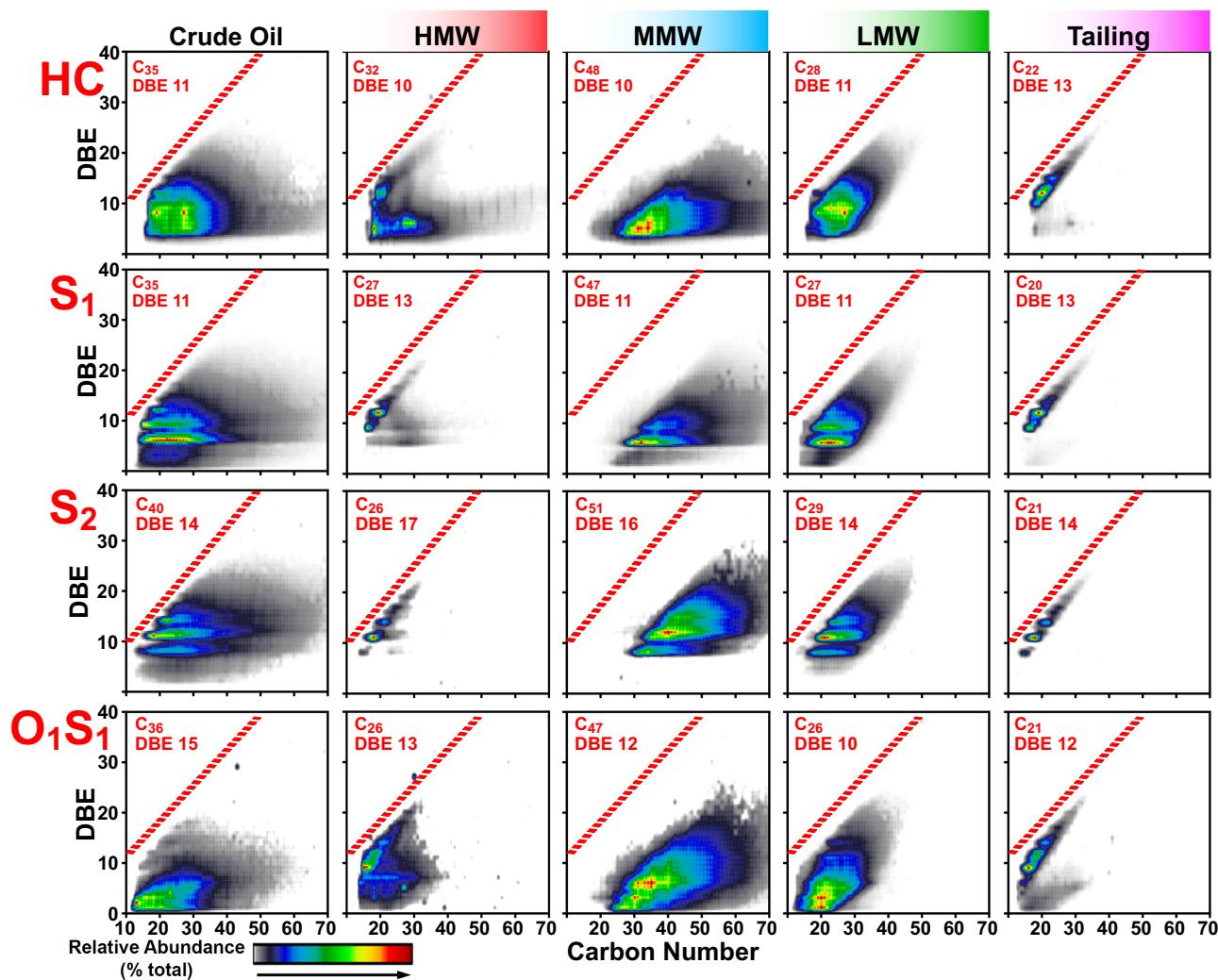


**Figure S2.** Positive ion APPI-derived isoabundance-contoured plots of double bond equivalents vs. carbon number for the HC (top), O<sub>1</sub> (middle) and O<sub>2</sub> (bottom) heteroatom classes which were most abundant in the high M.W. GPC aggregate fraction.

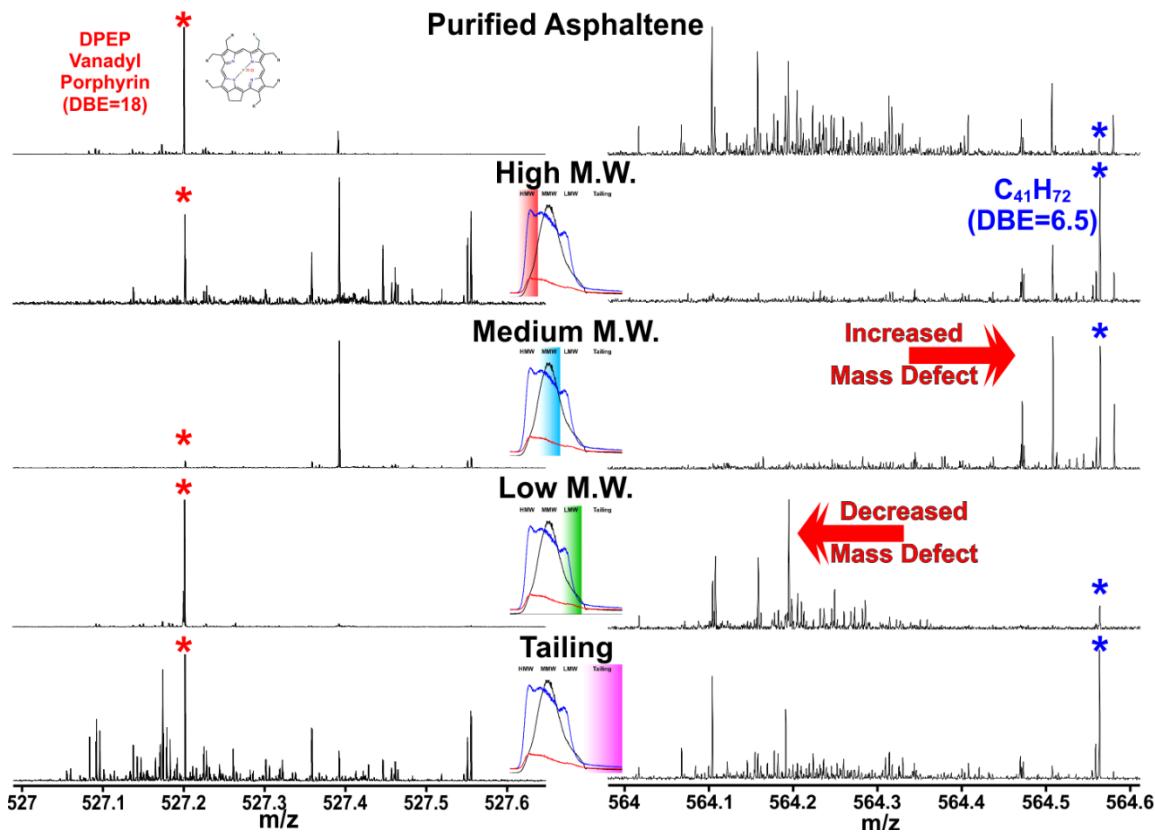
## Heteroatom Class Distribution



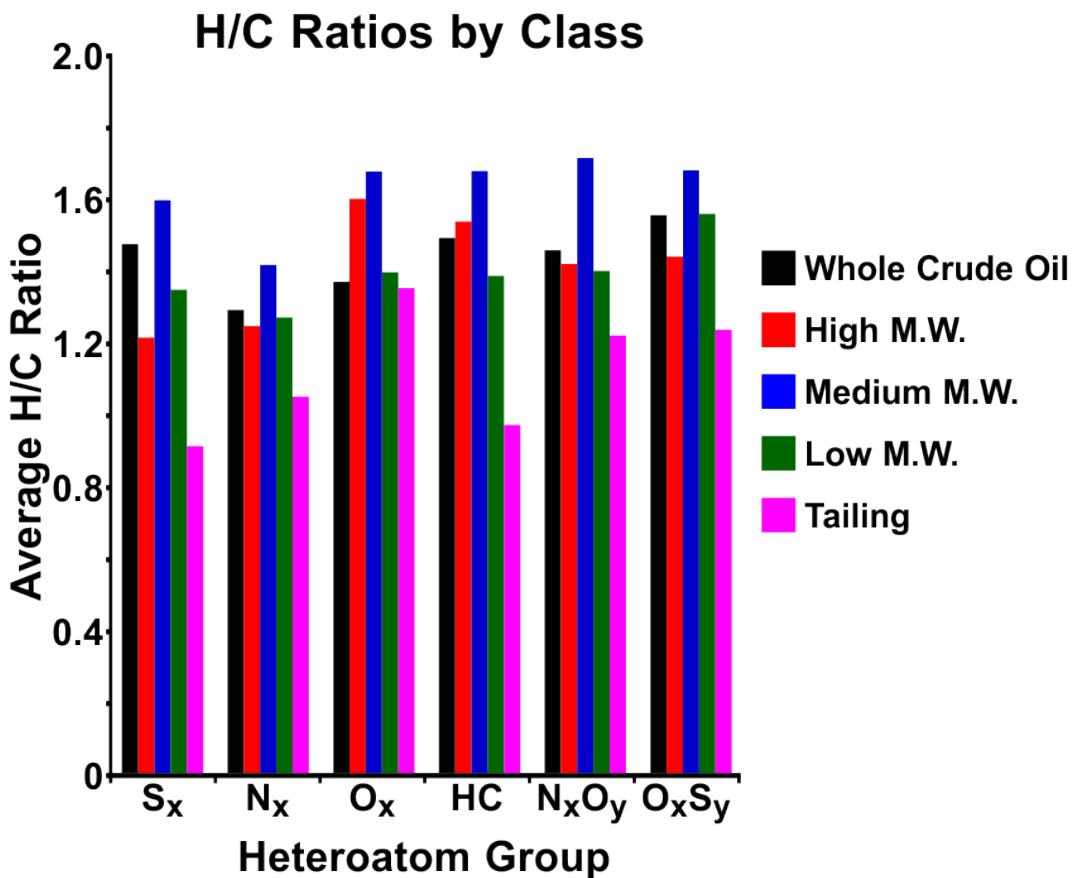
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