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Characterisation of Maya Crude Oil *(in terms of mass and structure)*

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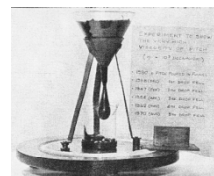
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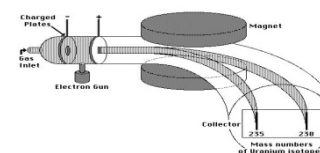


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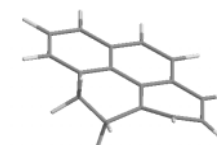
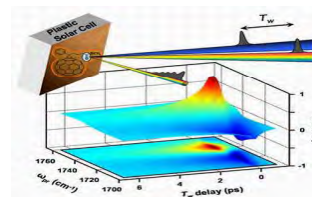
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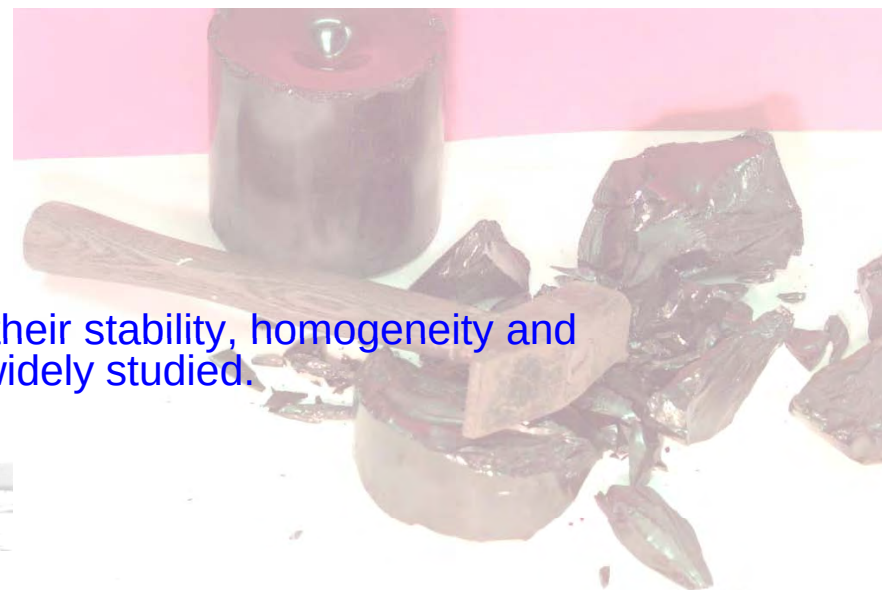
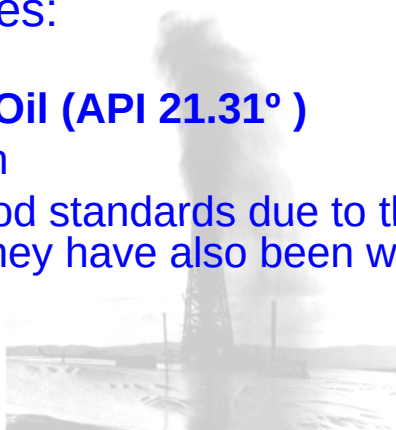


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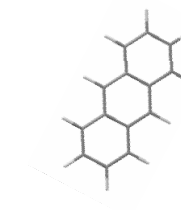


- Standard samples:

- **Maya Crude Oil (API 21.31°)**
- Coal Tar Pitch
- These are good standards due to their stability, homogeneity and availability. They have also been widely studied.



- Real Samples
- Conversion of light materials into heavier ones (oils into pitches)
- Conversion of heavy materials into lighter ones (heavy residues to liquids)
i.e. hydro-cracking, liquefaction as well as gasification, pyrolysis, combustion



Fractionation Methods



- Maya crude oil was fractionated by two methods:
 - First, *solvent separation* was used to produce four fractions

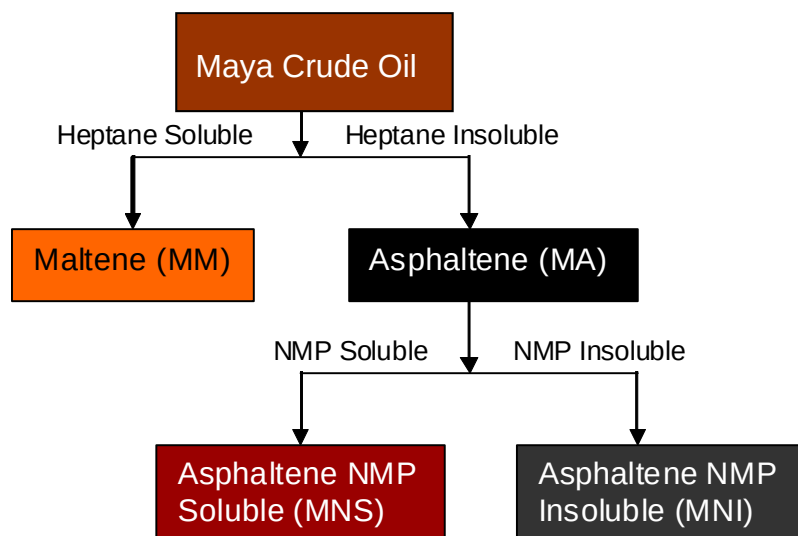
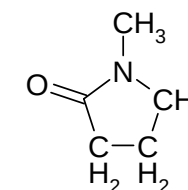


Table 1, Mass balance for the Maya crude-oil solubility fractionation

Sample	Notation	% of Crude	% of Asphaltene
Maya Crude Oil	Maya	100.0	n/a
Maltene	MM	88.5	n/a
Asphaltene	MA	11.5	100.0
NMP insoluble fraction of the asphaltene	MNI	6.3	54.8
NMP soluble fraction of the asphaltene	MNS	5.2	45.6

Errors were estimated at $\pm 0.2\%$

NMP is a good solvent for aromatics



These sub-fractions of the crude oil were used to test recently developed methods for identifying structural features and estimating mass distributions in complex hydrocarbon mixtures

Fractionation via TLC

To aid the characterisation of the solubility fractions
 'thin layer chromatography' (TLC) was used

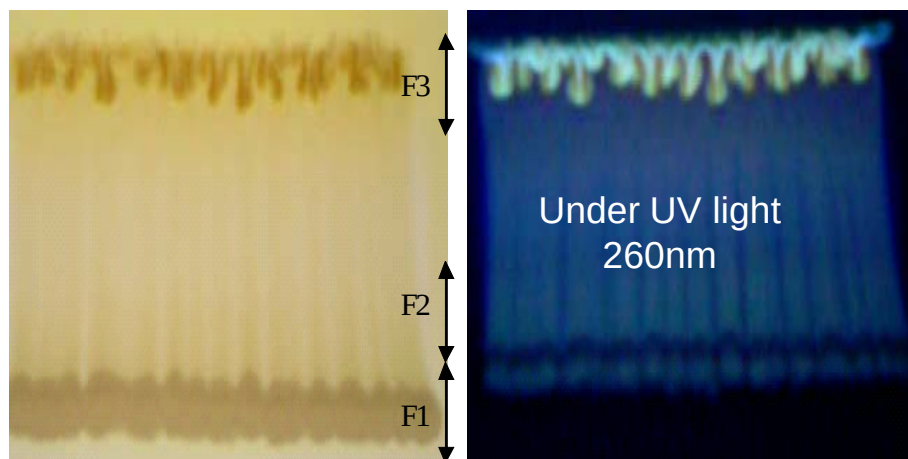


Figure 1a, TLC-plate of the **Maya maltene (MM)** sample eluted with **heptane** and then **CHCl₃**, under visible light and UV (260nm).

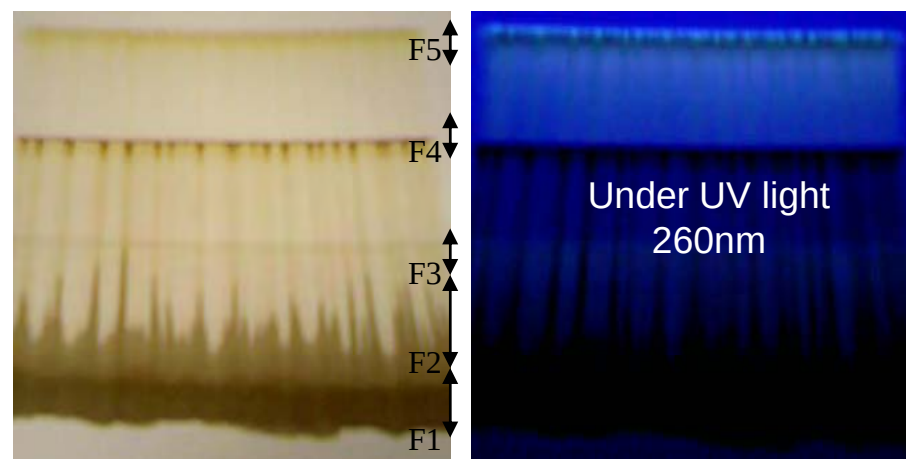


Figure 1b, TLC-plate of the **Maya asphaltene (MA)** sample eluted with **acetone**, then **CHCl₃** and finally **toluene**, under visible light and UV (260nm).

The aim of this work was to isolate the highest mass species by removing as many of the lighter components as possible

Fractionation via TLC

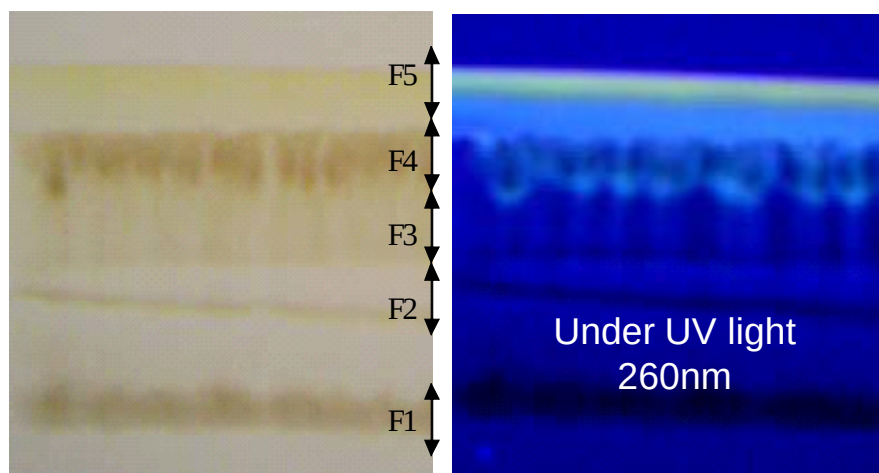


Figure 1c, TLC-plate of the **Maya asphaltene NMP soluble (MNS)** sample eluted with **CHCl₃**, then **NMP**, followed by **acetone** and finally **toluene**, under visible light and UV (260nm).

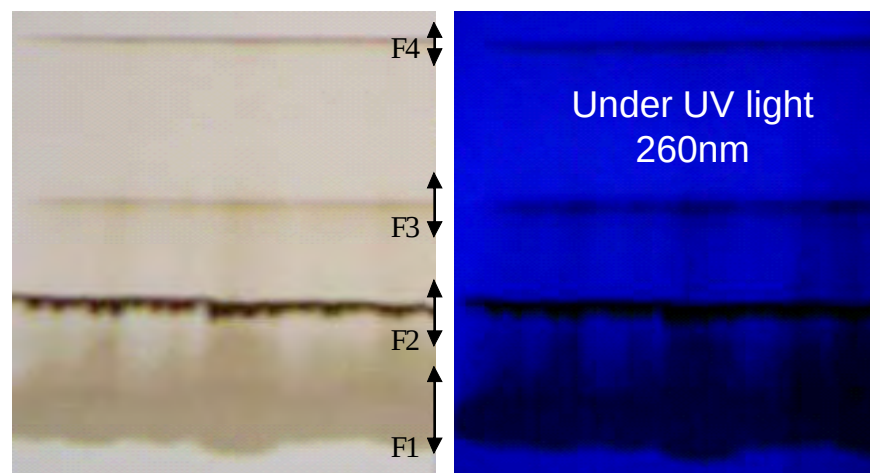


Figure 1d, TLC-plate of the **Maya asphaltene NMP insoluble (MNI)** sample eluted with **acetone**, then **CHCl₃**, followed by **toluene** and finally **pyridine**, under visible light and UV (260nm).