

El coque representa una materia prima para la industria nacional con aplicaciones potenciales que podrán impulsar el desarrollo tecnológico del país.

Escuela de Temática sobre Coque del Petróleo



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- Ronald Blanco.
- Henry Labrador.
- Pedro Huice.
- Juan Pereira.



Fortaleciendo la Cooperación Academia-Industria

Dirigido a: Estudiantes, Tesistas pre-post- Grado, Profesionales de la Industria.

Estudiantes, Pre-grado y Post-Grado: 500 bs

Profesionales: 700bs

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Cupo Limitado para 60 personas

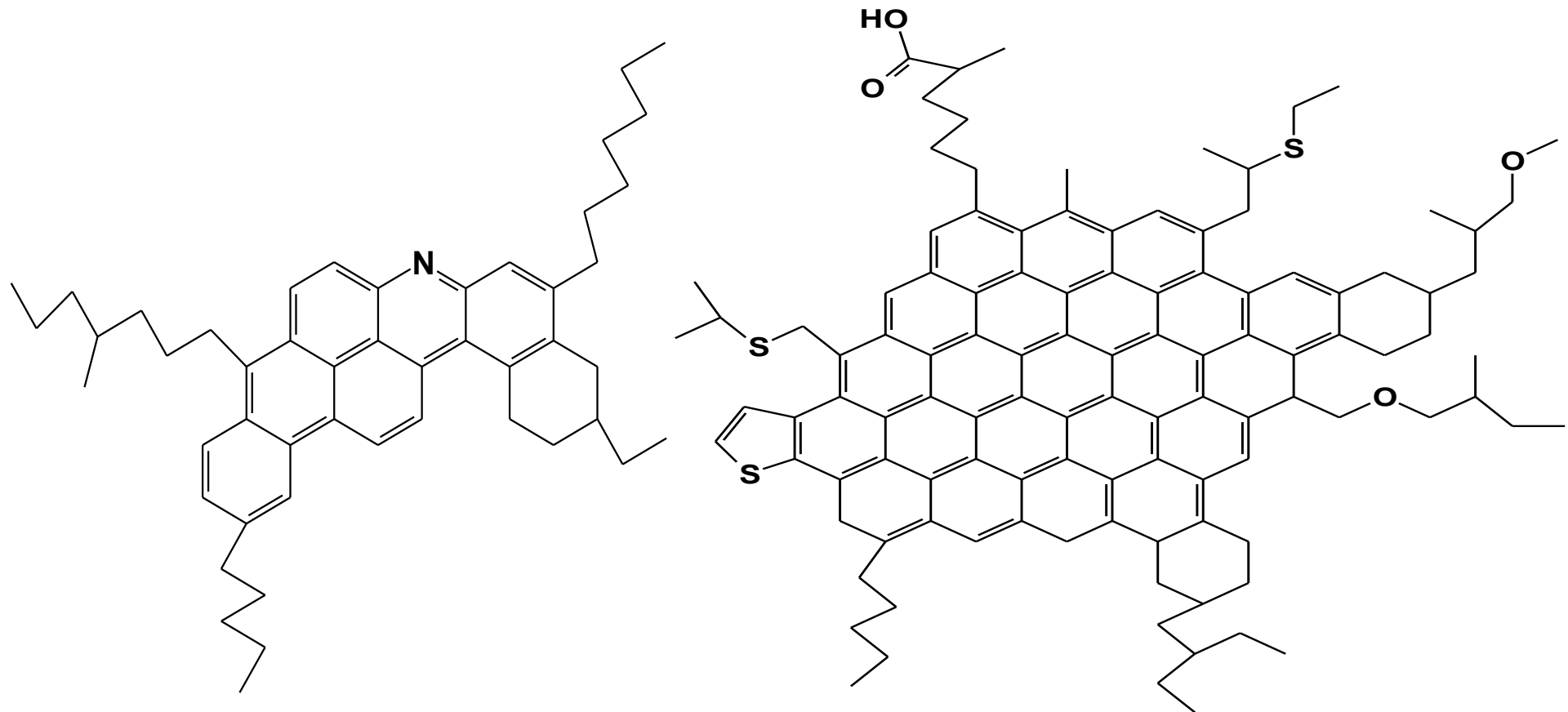


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Escuela de Temática sobre Coque del Petróleo

Dr. Henry Labrador Sánchez



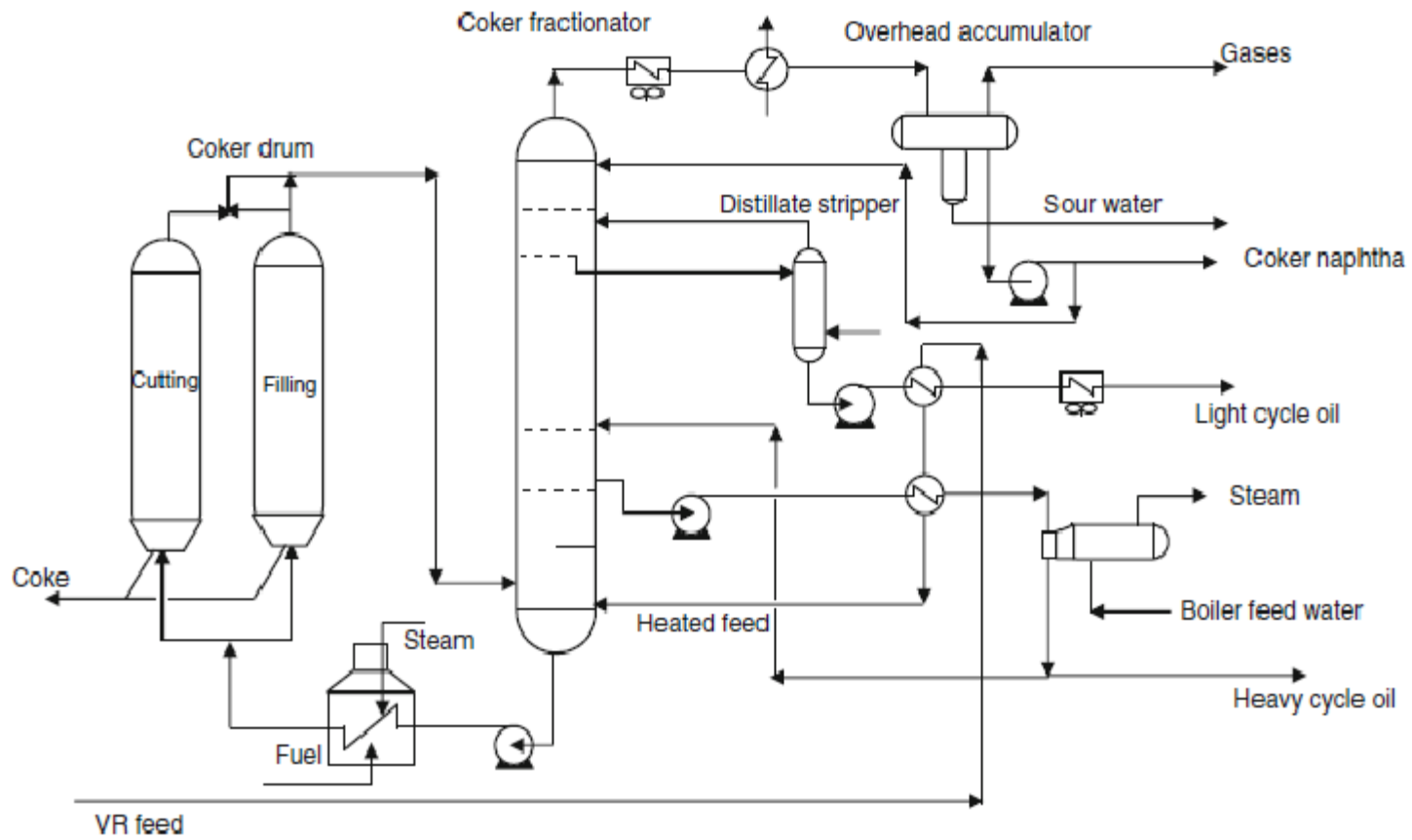
Origen del Coque

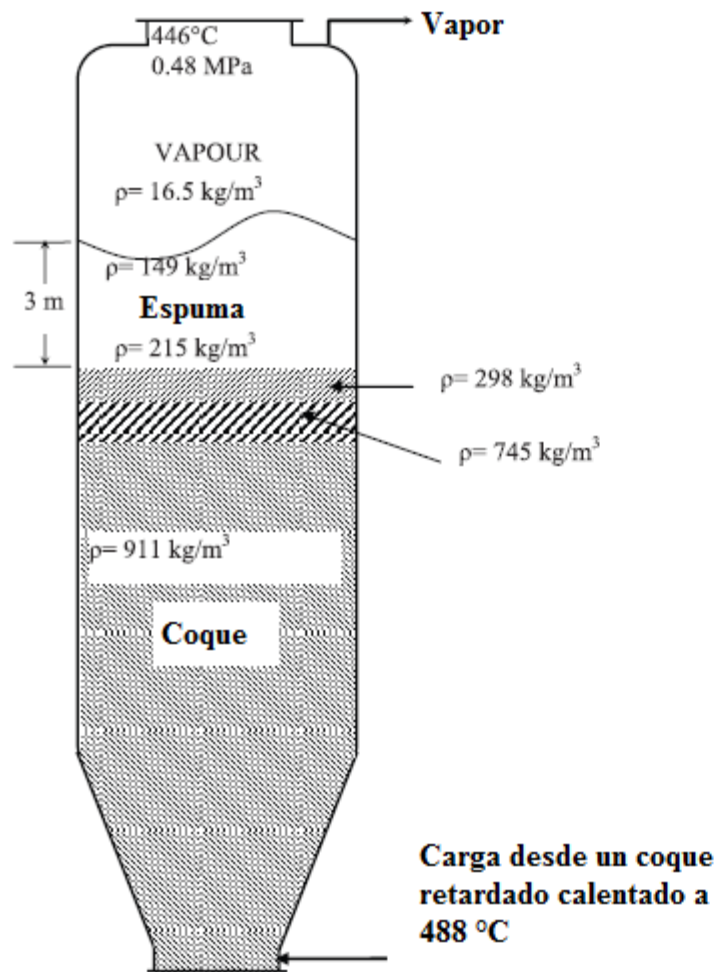
- **Térmico** .-Reducción de viscosidad con la temperatura (visbreaking)
.- Coquificación retardada. (delayed coking)
.- Flexicoking

.- Catalítico

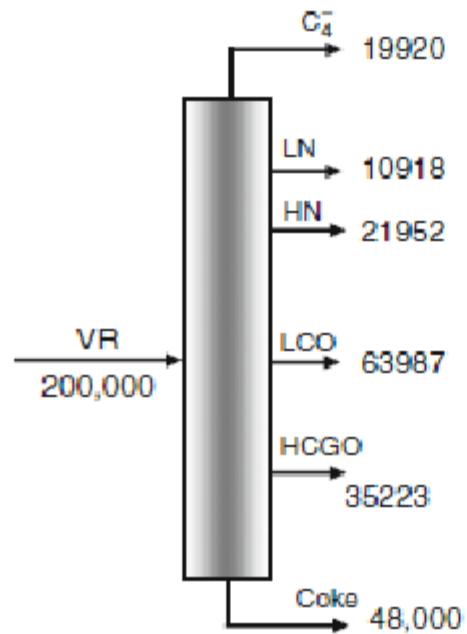
.- Extracción

.- Adición de Hidrógeno





Formación de coque en tanque de una unidad de coque retardado (Nelsons, 1970)



- .- Saturados**
- .- Aromáticos**
- .- Resinas**
- .- Asfaltenos**

Saturados

Aromáticos

Resinas

Asfaltenos

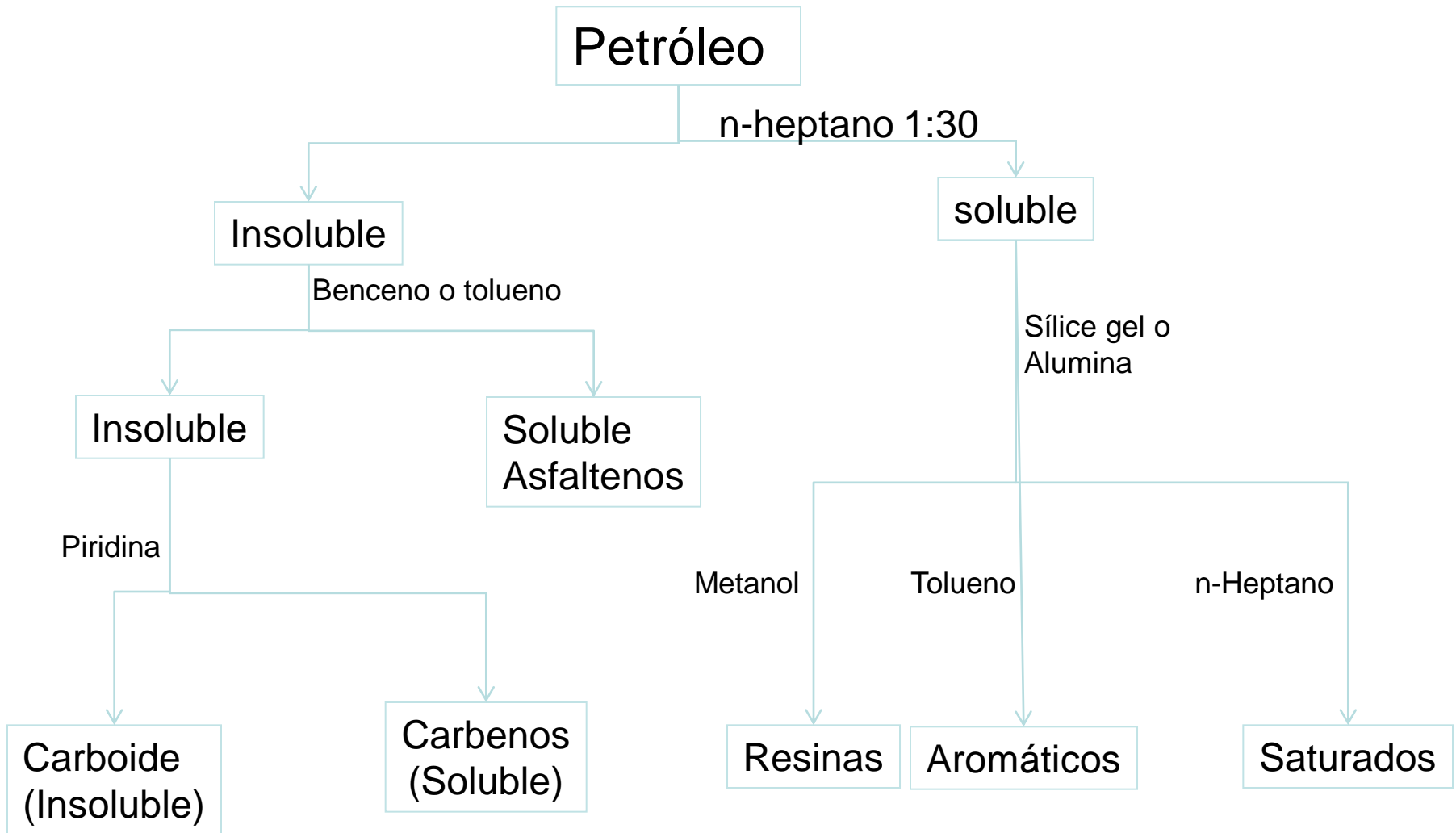
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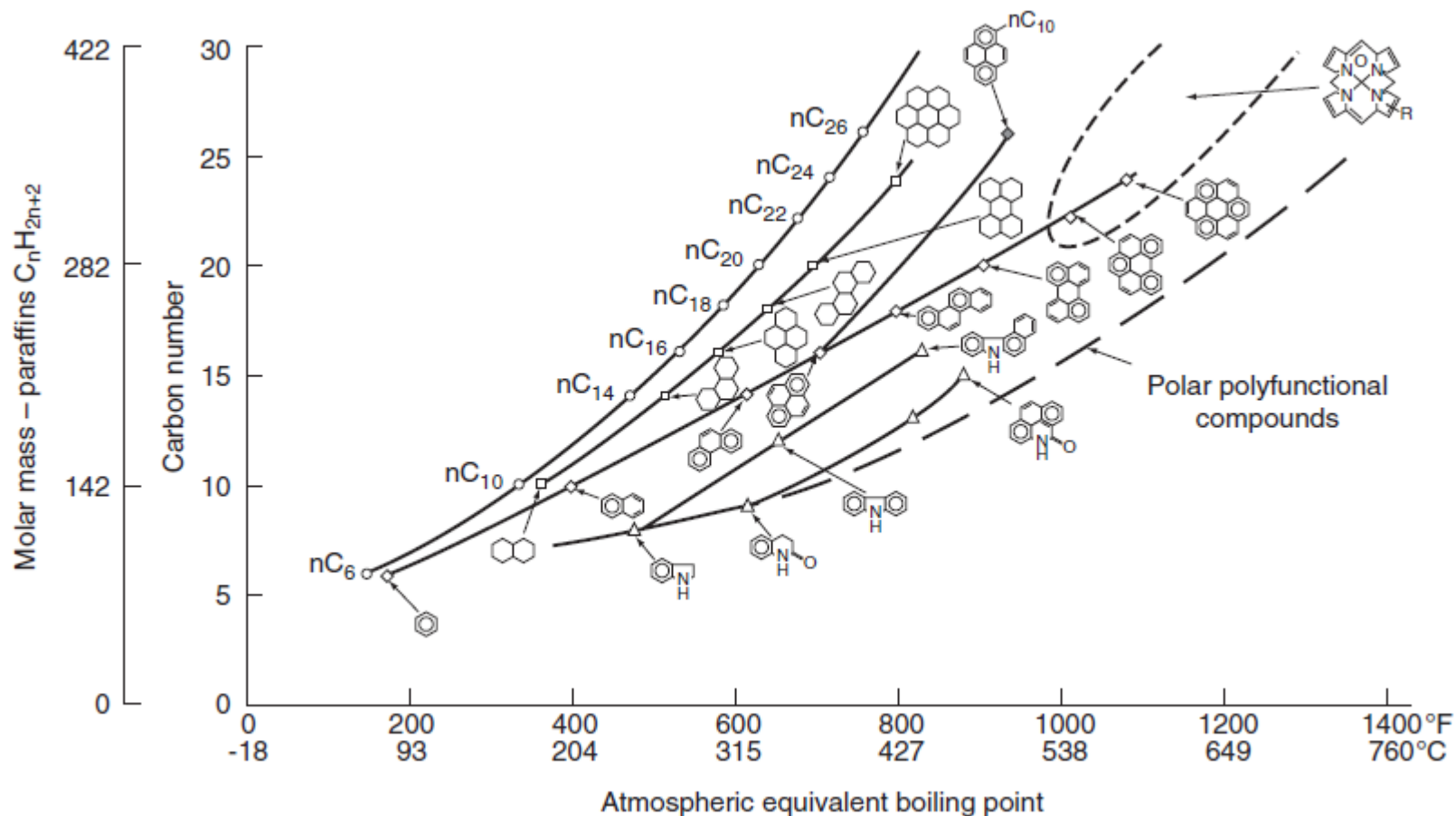
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Tabla .- Propiedades y análisis elemental de algunos crudos Venezolanos

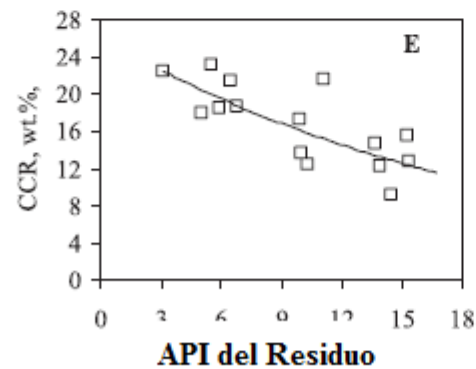
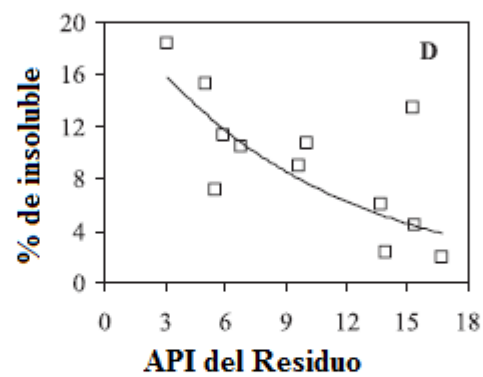
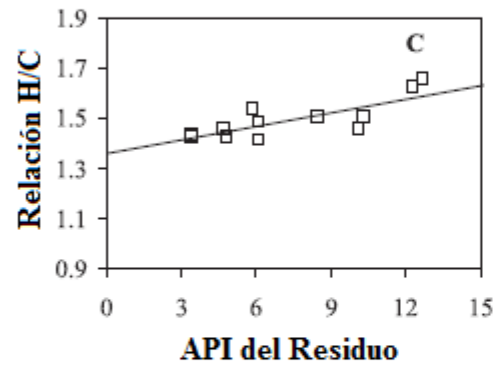
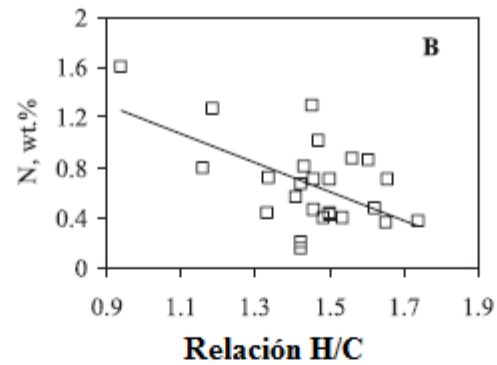
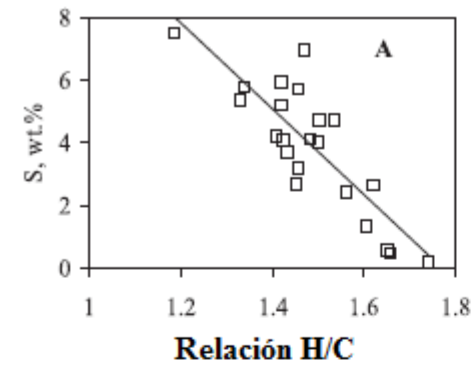
CRUDO	°API	%Asf.	%C	%H	%N	%O	%S	H/C	Mn*
Ayacucho	8	14	83.4	7.6	1.8	1.9	4.5	1.09	1661
Carabobo	8	13	81.2	7.7	2.1	3.5	5.5	1.16	1287
Furrial	21,5	2	85.5	6.9	1.7	2.5	3.4	0.97	2315
Ceuta	11	2	86.5	6.8	1.6	----	----	0.94	----
Boscan	10	12	81.5	10.3	0.6	----	5.5	1.52	----
Guafita	22	4	85.96	7.9	2.88	1.98	1.28	1.09	



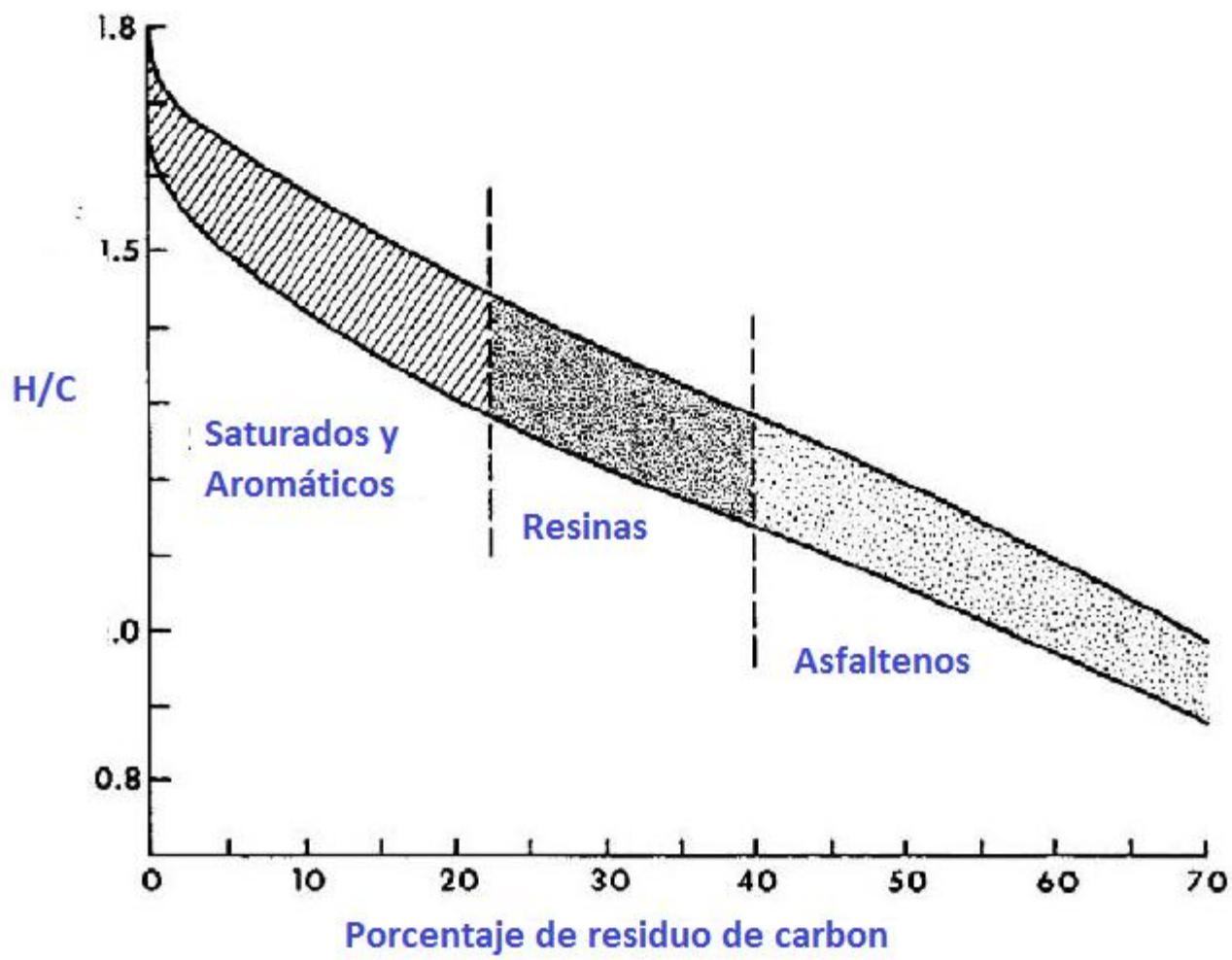
Esquema general del fraccionamiento del petróleo

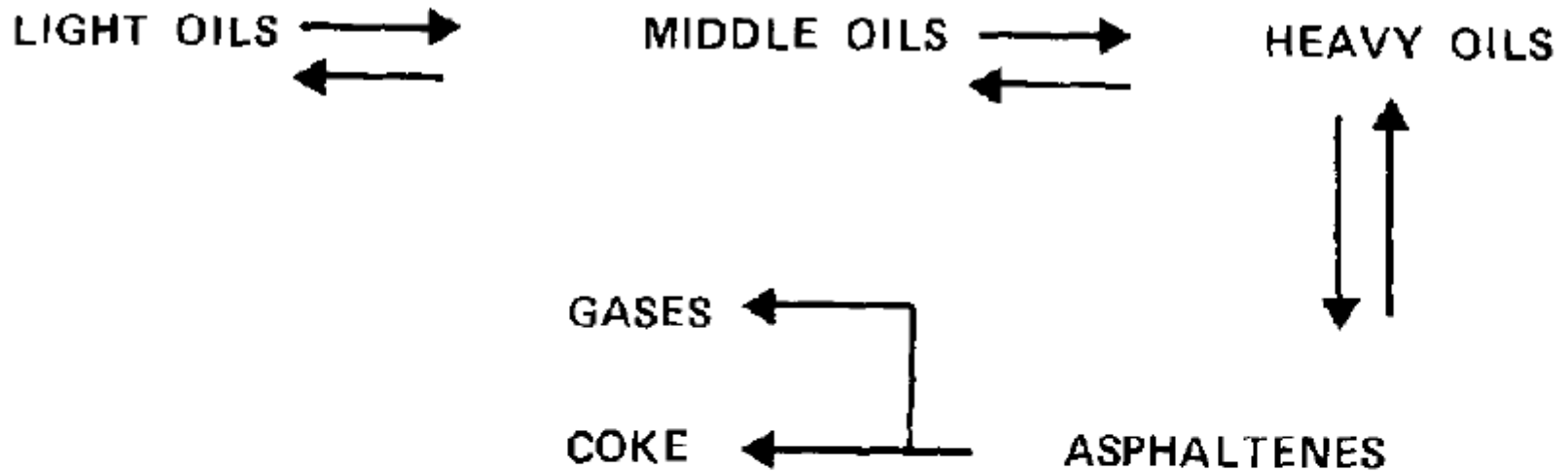


Altgelt KH; Boduszynski M. In *Composition and analysis of heavy petroleum fractions*. Ed Dekker, New York, **1994**.

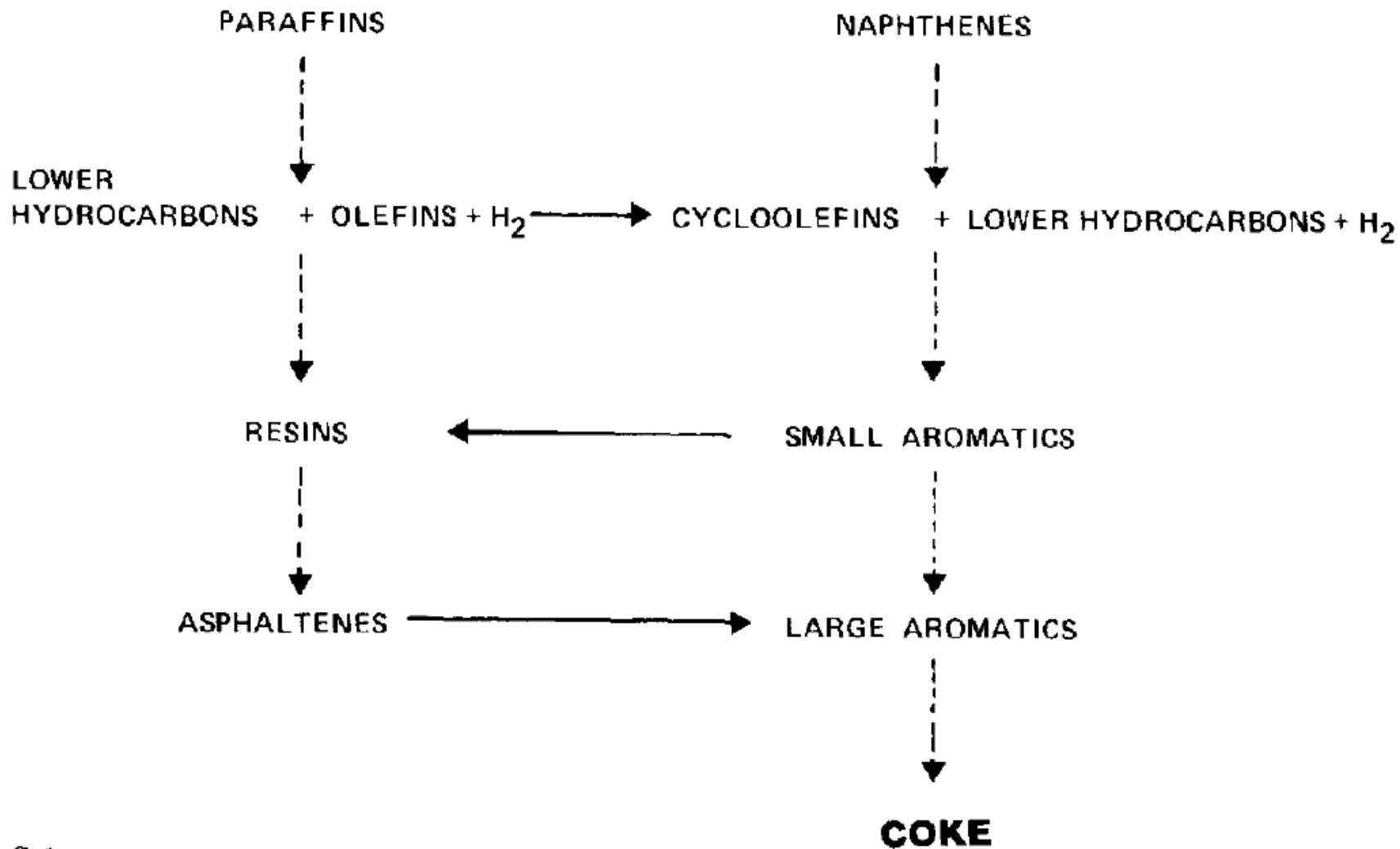


Variación química y física de los residuos




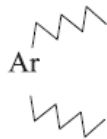


M. Absi-Halabi and A. Stanislaus 1991

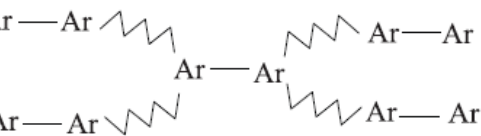


Scheme 1.

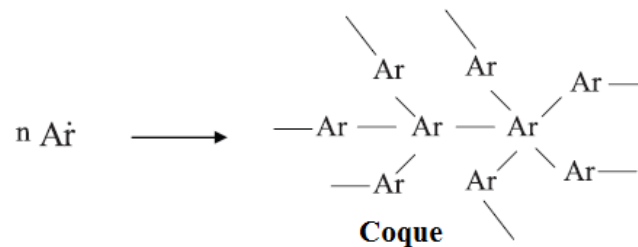
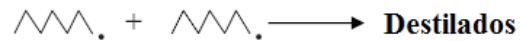
Saturados: 

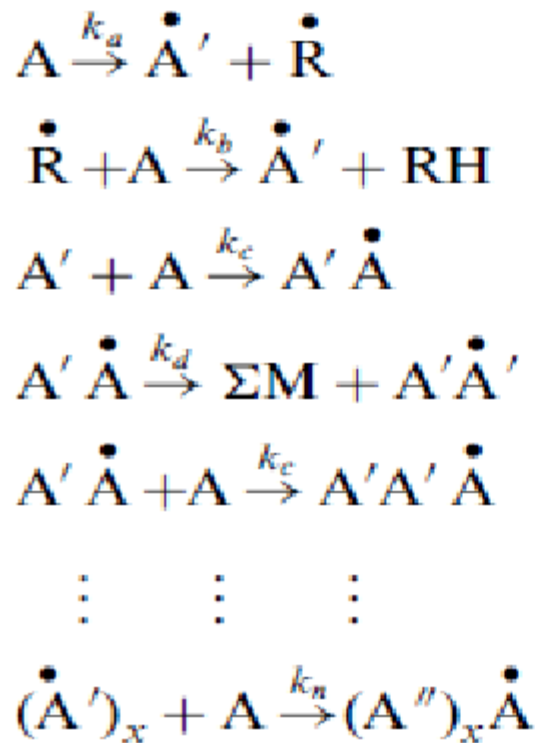
Aromáticos: 

Resinas: 

Asfaltenos: 

Posibles reacciones en la formación de coque

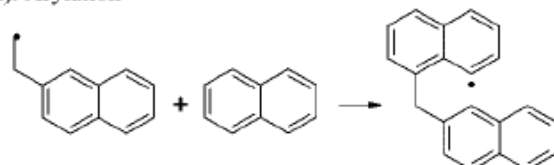




RZ Magaril, Teoreticheskie ositovy himiceskoi pererabotki nefti, Himiia, Moskva, 1976.

Scheme 1

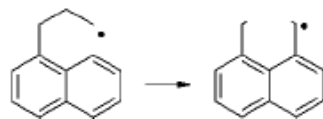
(i). Arylation



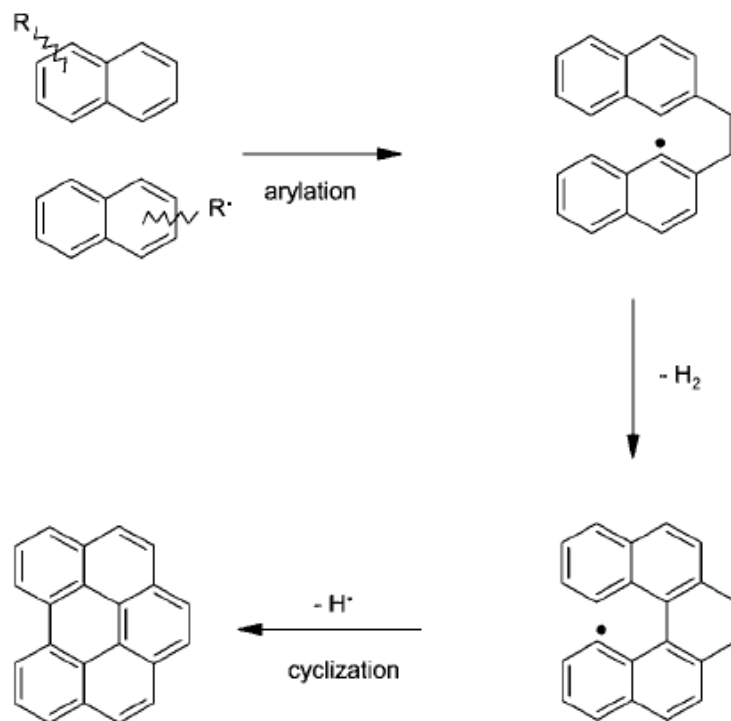
(18) Dyker, G.; Borowski, S.; Heiermann, J.; Korning, J.; Opwis, K.; Henkel, G.; Kockertling, M. *J. Organomet. Chem.* 2000, 606, 108–111.

(19) Speybroeck, V.; Hemelsoet, K.; Waroquier, M.; Marin, G. *Int. J. Quantum Chem.* 2003, 96, 568–576.

(ii). Cyclization



Scheme 2



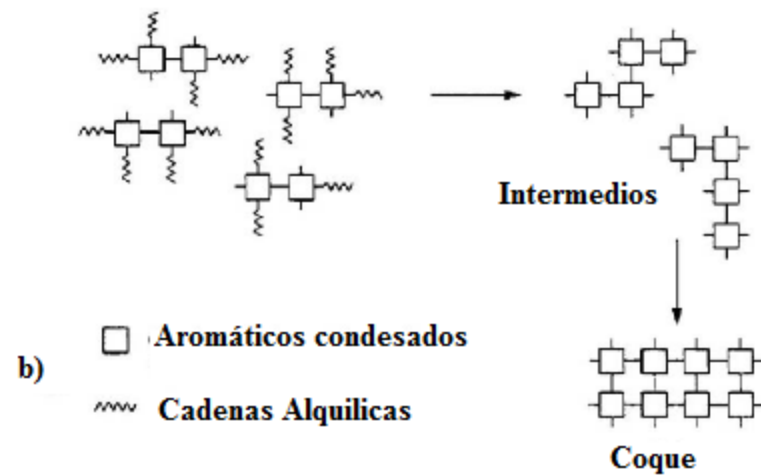
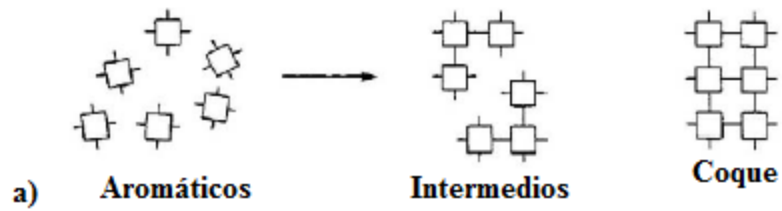
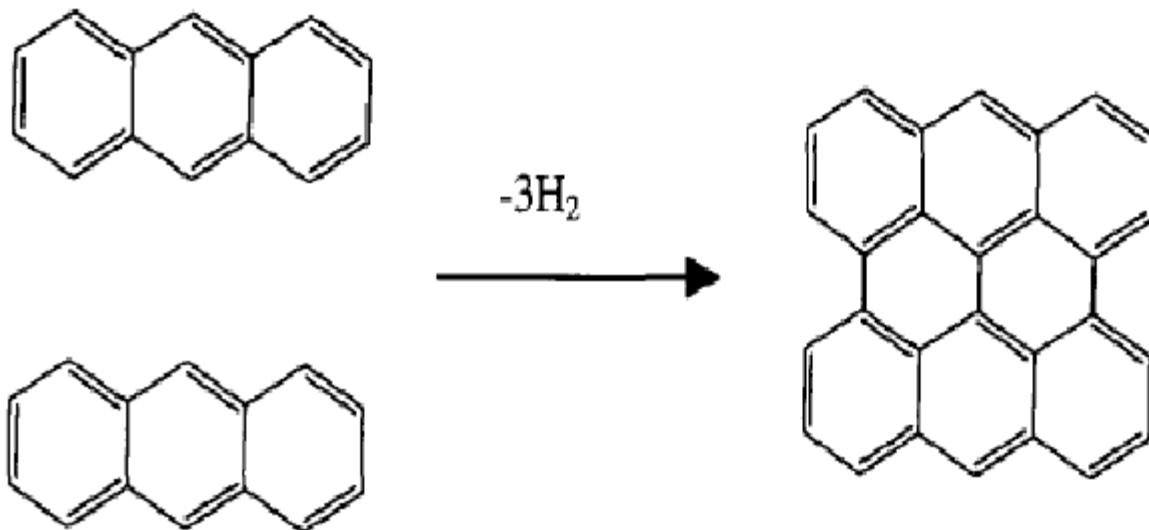


Figura 8.- Formación de coque



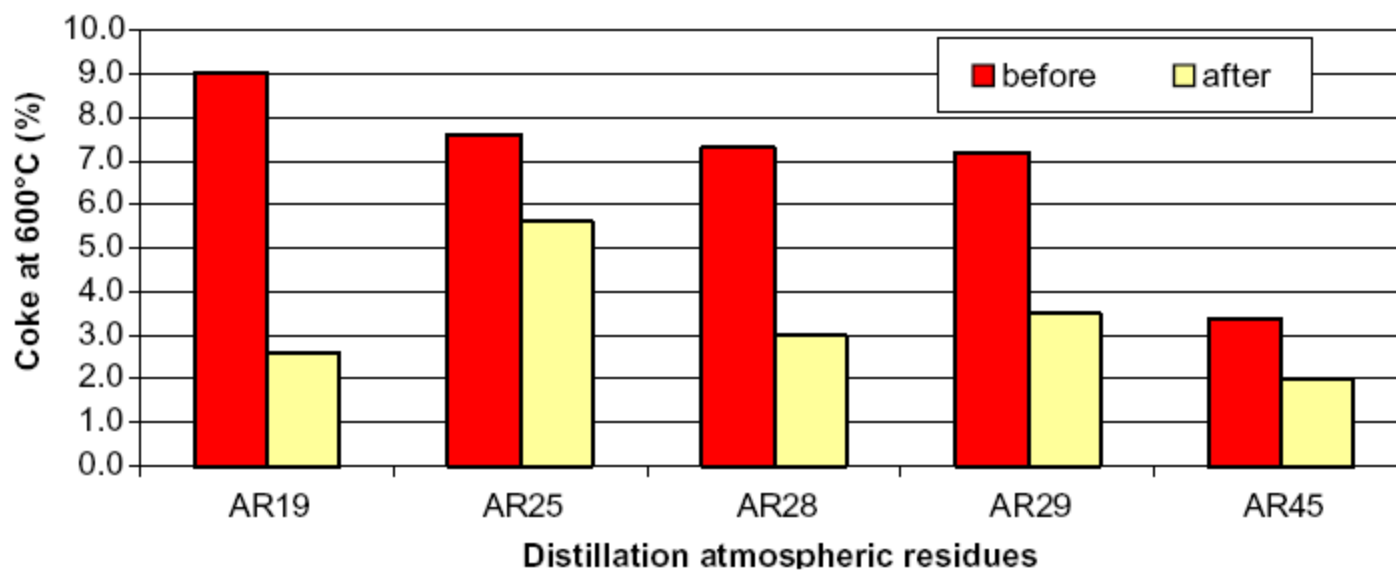
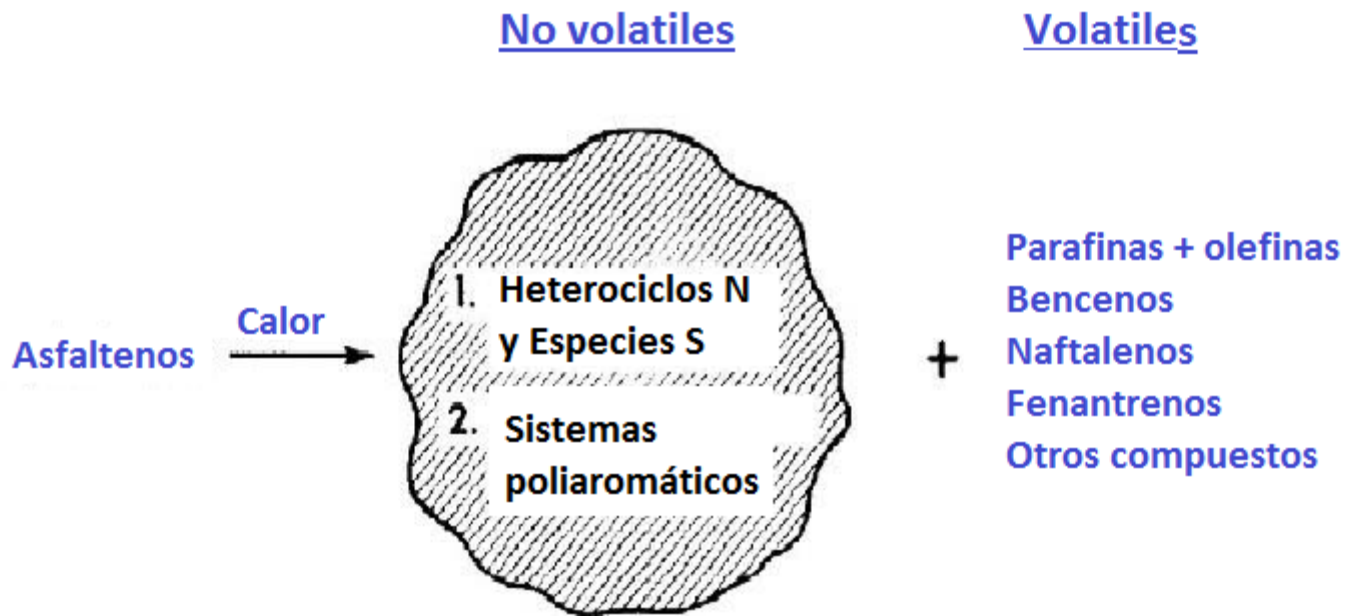


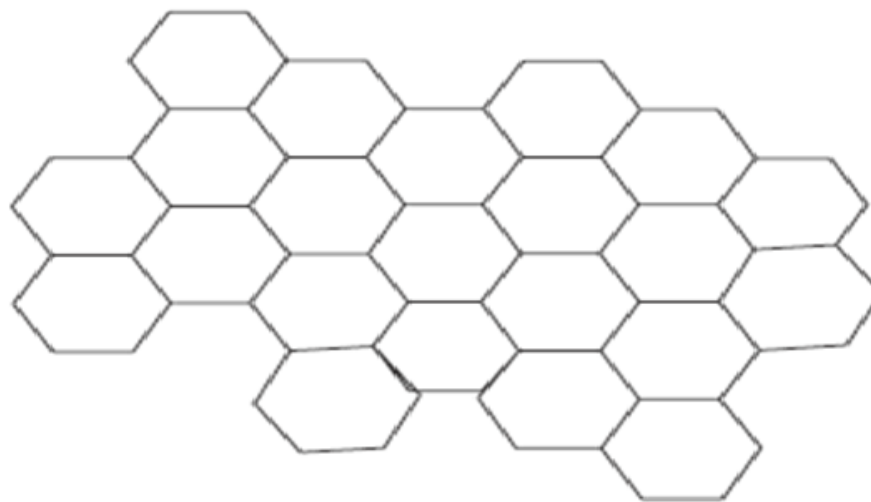
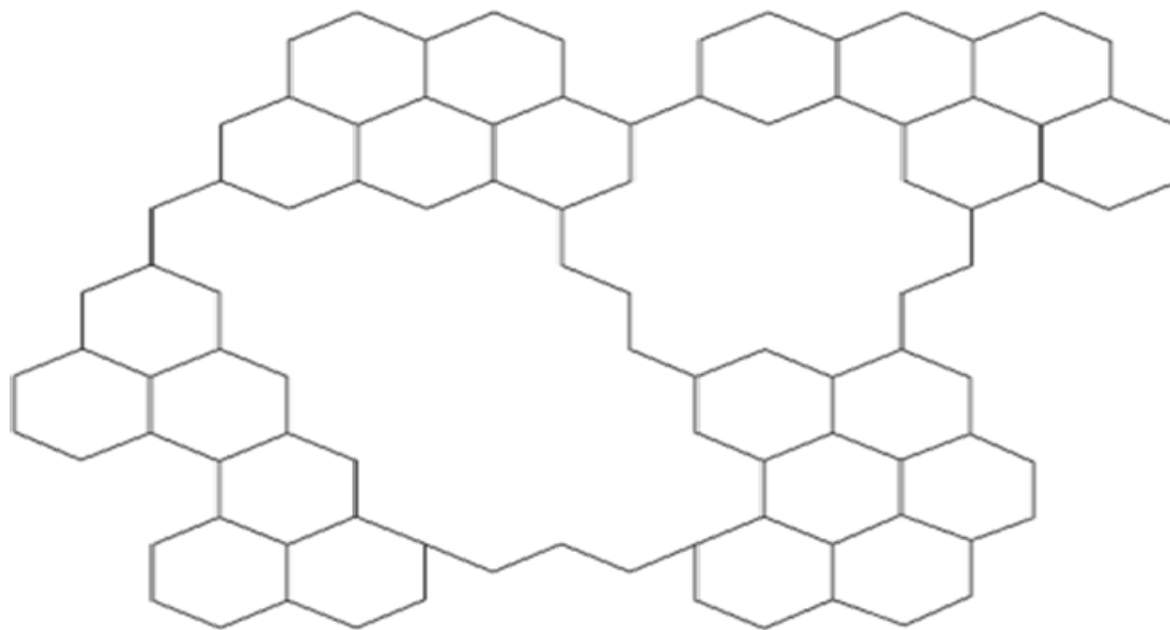
Figura 6. Material carbonoso determinado a 600°C antes y después de la extracción de asfaltenos

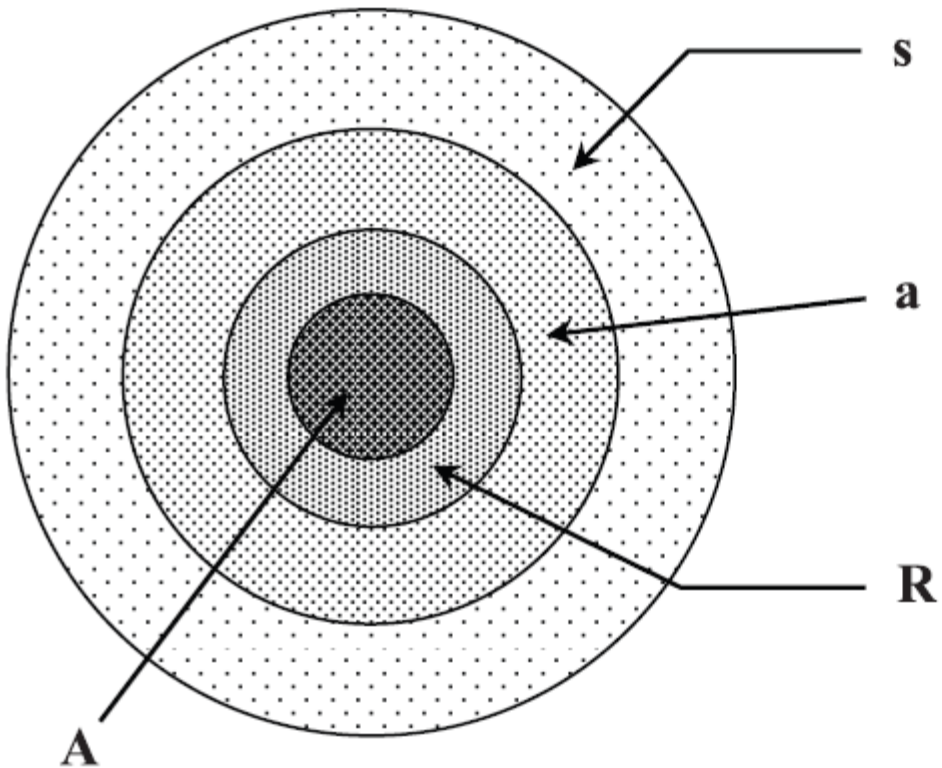
Tabla 1 Porcentaje de asfaltenos en los residuos atmosféricos

Atmospheric residue samples	Asphaltenes (%) ^a	C/H of asphaltenes ^b
AR19	7.3	0.7
AR25	7.0	0.7
AR28	6.8	0.8
AR29	4.9	0.8
AR45	0.9	0.7

M.L.A. Gonçalves et al. / Fuel 86 (2007) 619–623







Estructura de la microemulsion del petróleo

Wiehe, I. A. and K. S. Liang, "Asphaltenes, Resins, and Other Petroleum Macromolecules." Fluid Phase Equilib. 117.

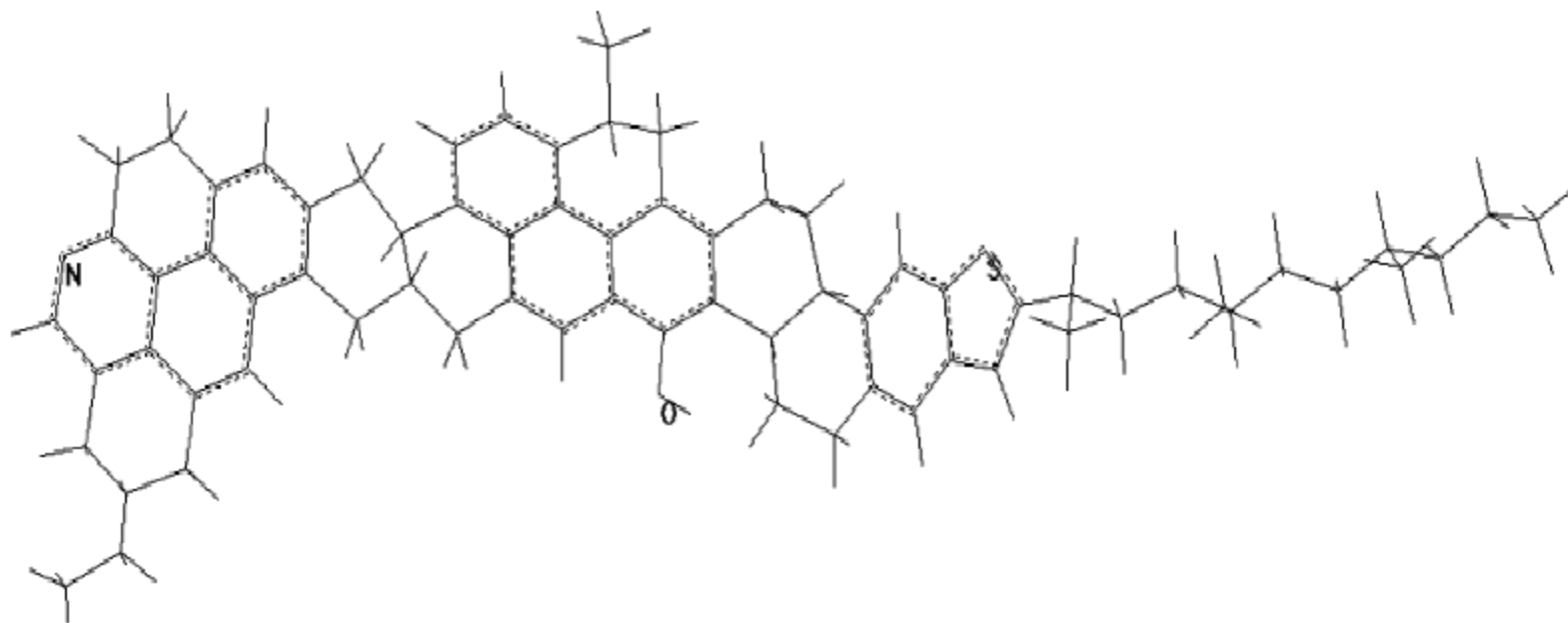


Figura 16.- Estructura rigida condensada de un modelo de asfaltenos para la fracción A1(Acevedo 2007)

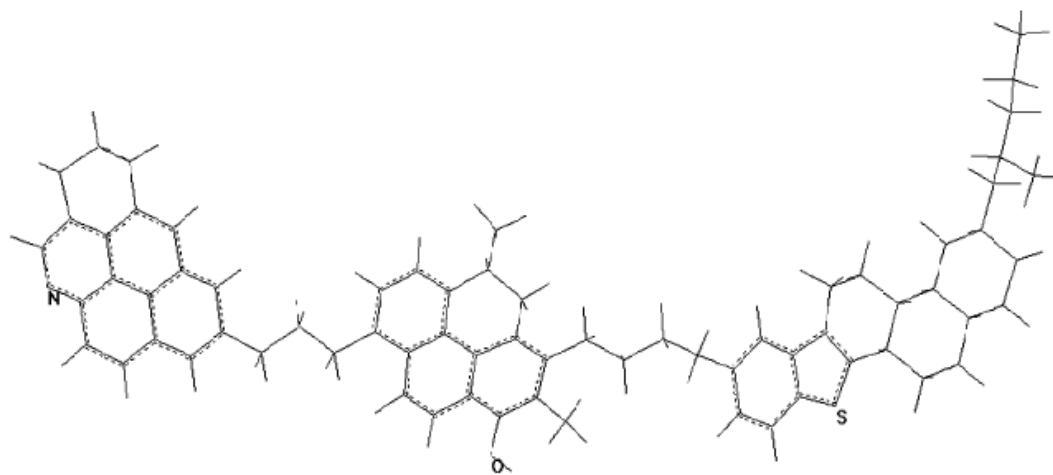


Figura 18.- Estructura flexibe tipo rosario para la fracción A2 (Acevedo, 2007)

Energy & Fuels, Vol. 21, No. 4, 2007

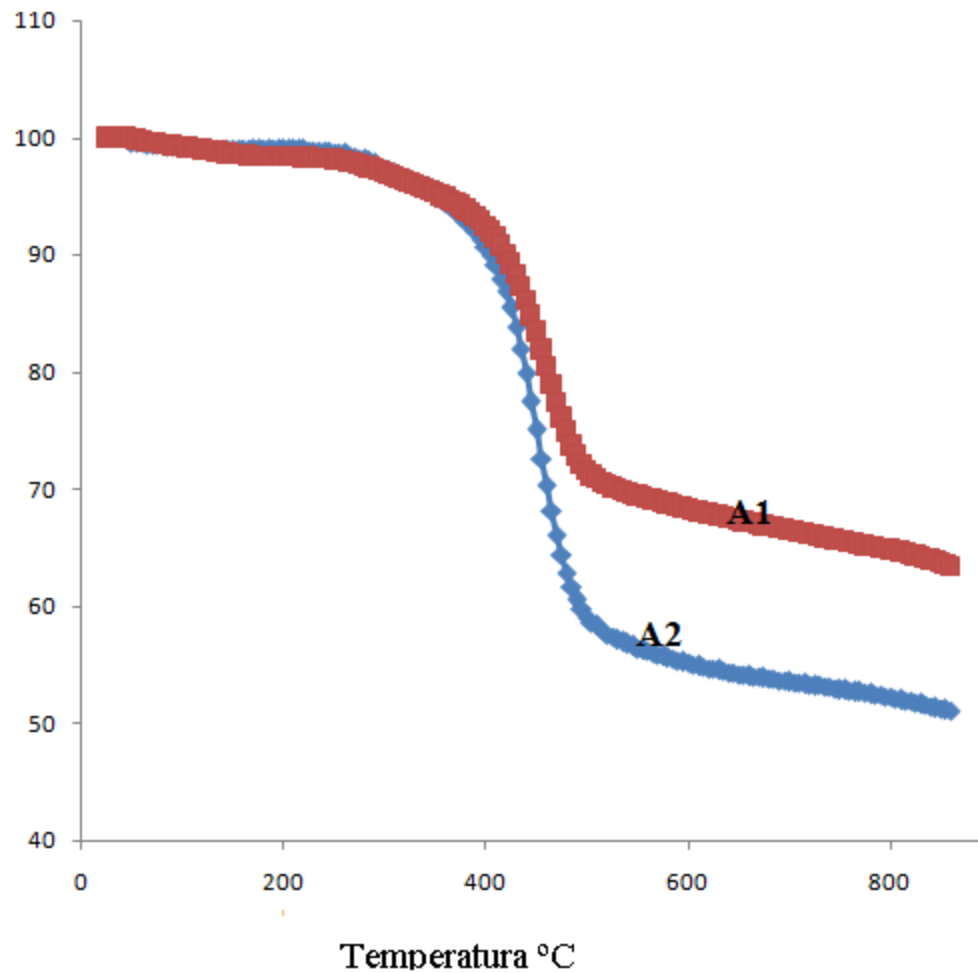
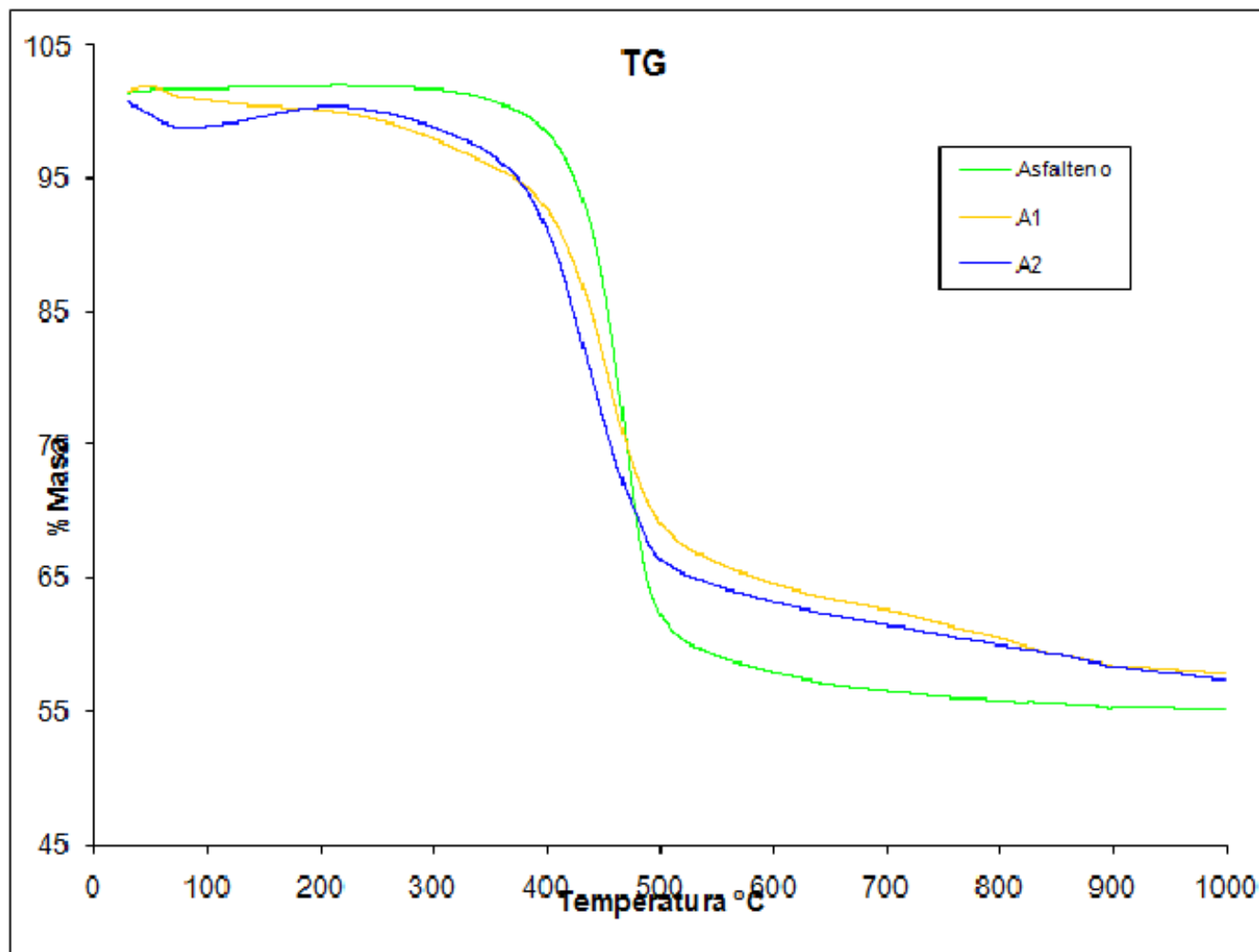


Figura 19.- TGA de las fracciones del asfalto Ayacucho (López, 2013)



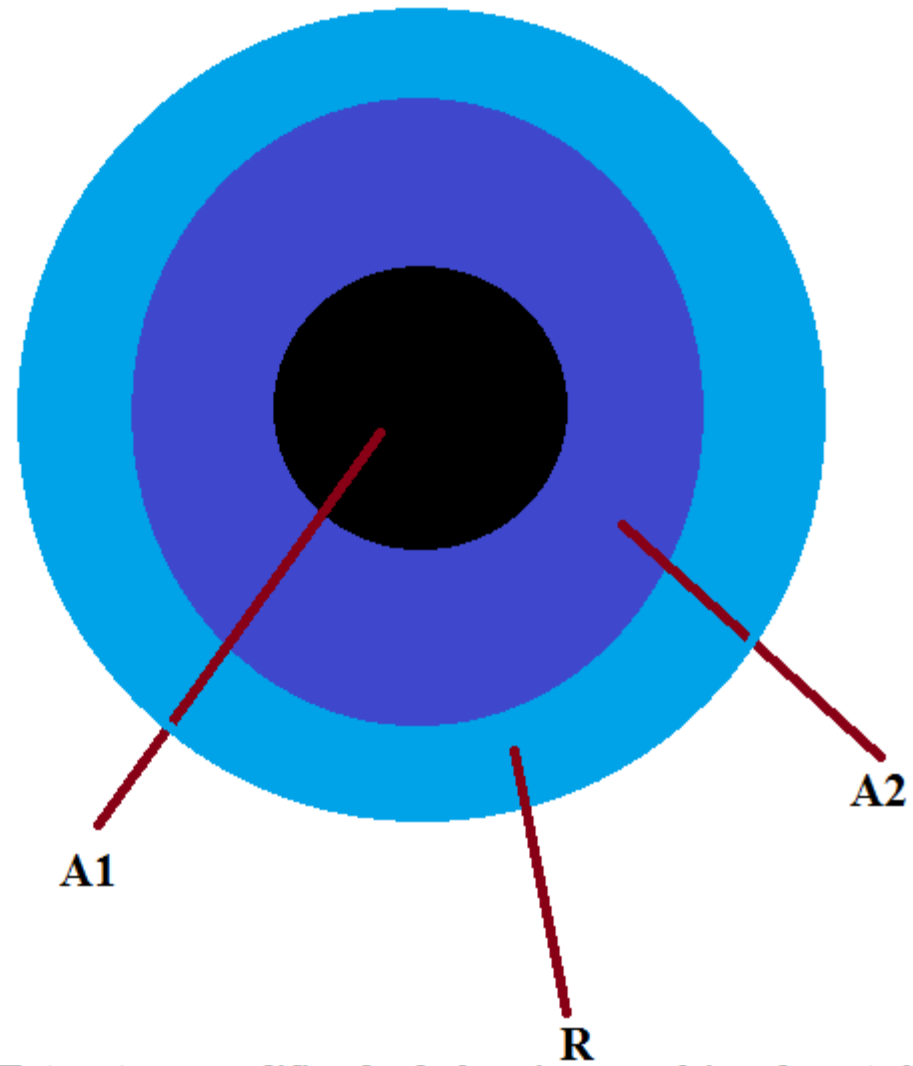


Figura 20.- Estructura modificada de la microemulsion de petr3leo



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Gracias por su atención