

Effects of Natural Antioxidant Agents on the Bitumen Aging Process: An EPR and Rheological Investigation

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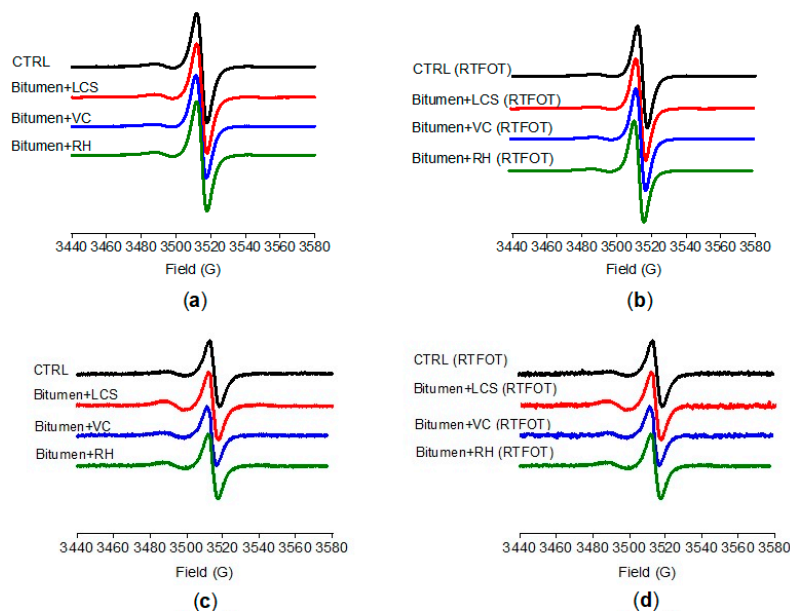


Figure S1. X-band EPR spectra of asphaltene and maltene fractions obtained from bitumen samples mixed with 2% w/w of antioxidants, registered at room temperature. CTRL indicates the control sample with no antioxidant added. (a) asphaltene fractions from unaged samples. (b) asphaltene fractions from aged samples. (c) maltene fractions from unaged samples. (d) maltene fractions from aged samples.

Table S1. Landè factor (g) of EPR signals of asphaltene and maltene fractions obtained both from unaged bituminous samples and after artificial aging through RTFOT.

Sample	Asphaltene				Maltene			
	g of organic radicals		g of vanadyl		g of organic radicals		g of vanadyl	
	unaged	aged	unaged	aged	unaged	aged	unaged	aged
CTRL	2.0027	2.0027	2.0018	2.0019	2.0028	2.0028	2.0012	2.0012
Bitumen + LCS	2.0028	2.0028	2.0018	2.0019	2.0027	2.0027	2.0012	2.0012
Bitumen + VC	2.0028	2.0028	2.0018	2.0018	2.0027	2.0027	2.0014	2.0013
Bitumen + RH	2.0028	2.0027	2.0018	2.0019	2.0027	2.0027	2.0011	2.0012