Supporting Information

Upgrading Heavy Crude Oils and Extra Heavy Fractions in Supercritical Methanol

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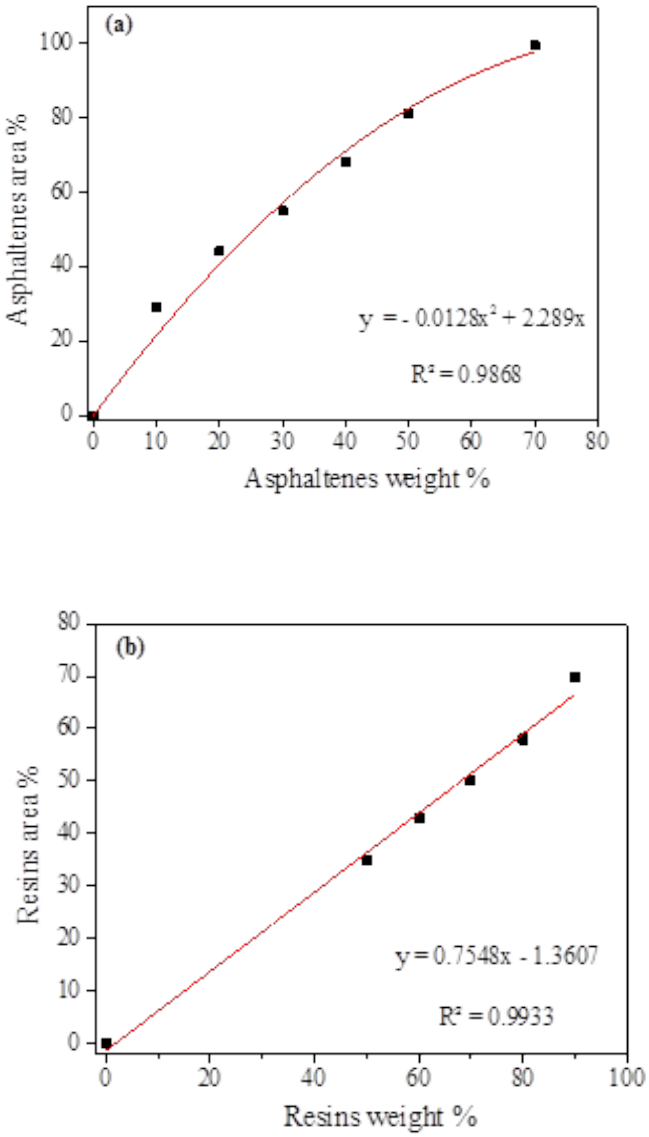

Figure S1. Calibration curves representing the relationship between area% and wt% contents of asphaltenes and resins determined using the thin-layer chromatography flame ionization detector (FID) employed for SARA analysis.

Table S1. Elements identified by X-ray fluorescence (XRF) analysis of VTB ash produced by calcination (700 °C, 30 min).

Elemental form	Content		Oxide form	Content	
	wt%	**ppmw**		**wt%**	**ppmw**
Si	8.897	88970	SiO_2	19.030	190300
Zn	2.952	29520	Al_2O_3	4.540	45400
K	2.700	27000	ZnO	3.663	36630
Al	2.340	23400	K_2O	3.140	31400
Fe	2.086	20860	Fe_2O_3	2.958	29580
Mo	1.110	11100	SO_3	2.210	22100
S	0.920	9200	MoO_3	1.660	16600
Ca	0.413	4130	CaO	0.559	5590
Mg	0.192	1920	MgO	0.332	3320
Ni	0.138	1380	P_2O_5	0.242	2420
P	0.106	1060	NiO	0.175	1750
V	0.099	988	V_2O_5	0.173	1730
Cr	0.077	771	Cr_2O_3	0.112	1120
Ti	0.068	680	TiO_2	0.110	1100
Cl	0.058	580	Cl	0.056	560
Mn	0.033	330	MnO	0.042	420
Total	**22.189**	**221889**	**Total**	**39.002**	**390020**

Gas composition (mole%)

Figure S2. Composition of gases produced during Laguna upgrading (400 °C, 30 MPa, 9.1wt%, 1 h).

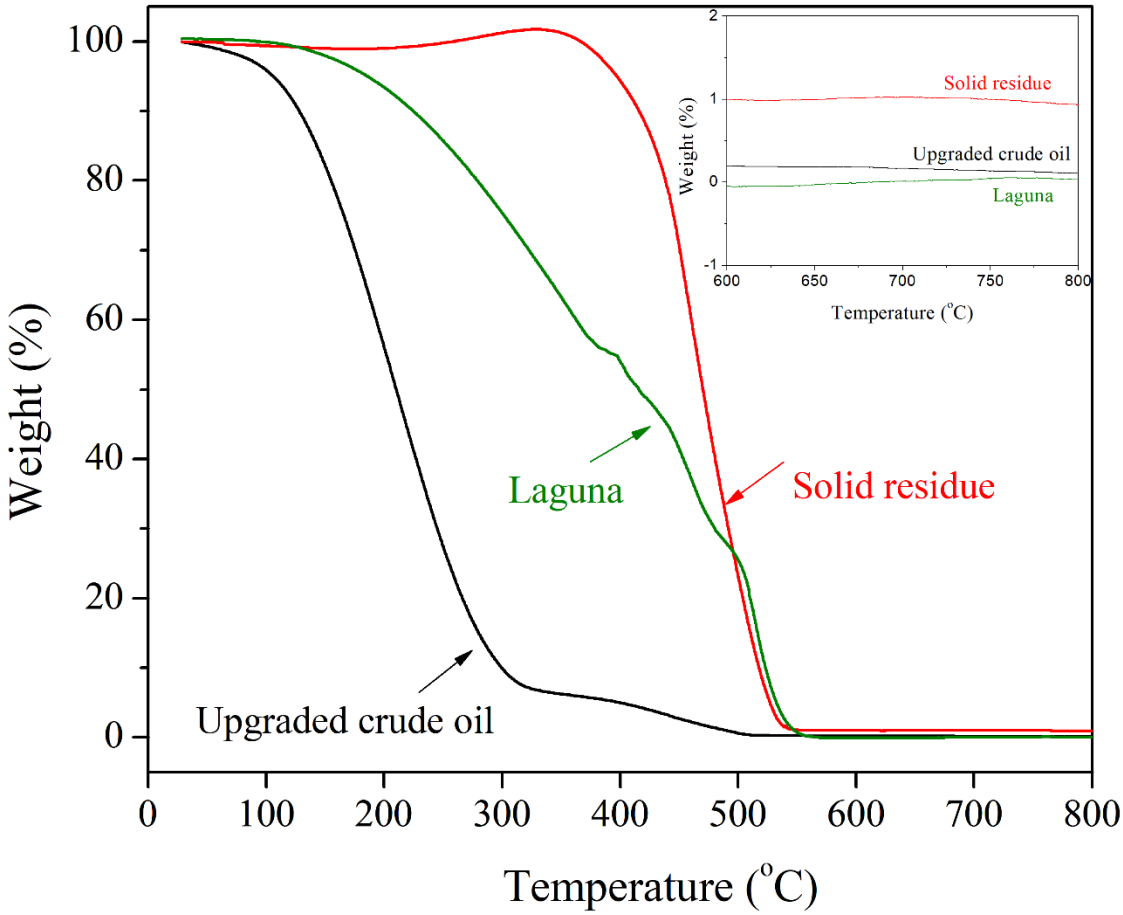

Figure S3. TGA profiles of Laguna, upgraded oil, and coke (scMeOH at 400 °C, 30 MPa, 9.1 wt%, 1 h).

Table S2. Elemental analysis (CHNSO) results for Laguna, upgraded oil, and coke (scMeOH at 400 °C, 15 MPa, 16.7 wt%, 1 h).

	Elemental content (wt%)					
	C	H	N	S	O	H/C
Laguna	85.2	10.3	0.2	2.8	1.6	1.45
Upgraded oil	82.6	9.6	0.07	2.2	1.5	1.50
Coke	87.5	4.2	1.0	3.4	1.5	0.58