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(54) Title: HIGH NAPHTHENIC CONTENT MARINE FUEL COMPOSITIONS

Boiling Point Range	Unit	-	371 - FBP	371 - FBP	371 - FBP	371 - FBP	371 - FBP	371 - FBP
		Conventional RMG380 VLSFO	Shale Fuel Oil 1 (FO 1)	Shale Fuel Oil 2 (FO 2)	Shale Fuel Oil 3 (FO 3)	Shale Fuel Oil 4 (FO 4)	Shale Fuel Oil 5 (FO 5)	Conventional Light Sweet Crude
n-paraffins	vol%	-	5.6	9.67	4.89	3.95	5.72	4.03
i-paraffins	vol%	-	33.05	28.24	18.12	21.32	21.96	11.91
naphthenes	vol%	-	47.73	46.47	35.17	50.09	47.45	37.27
1-ring aromatic ring class	vol%	-	7.49	8.49	15.17	11.27	11.2	13.89
Aromatics	vol%	80.8	13.62	15.49	41.62	24.58	24.7	46.78
Density at 15°C	kg/m ³	971.1	867.2	869.4	908.5	889.4	888	924.2
KV50	cSt	69.2	50.89	47.91	140.81	102.56	77.69	190
Aliphatic sulfur	wt%	-	0.01	0.011	0.075	0.044	0.037	0.223
Sulfur	wt%	0.475	0.014	0.017	0.217	0.057	0.049	0.97
Flash Point	°C	96	229	228	236	233	231	238
CCAI		853	753	756	781	765	768	793
Energy Content	MJ/kg	-	42.78	42.75	42.2	42.49	42.51	41.75
Carbon Intensity	g of CO ₂ /kg of fuel	3.19	3.152	3.154	3.172	3.166	3.166	3.158
Carbon	wt%	-	85.98	86.03	86.52	86.33	86.36	86.12
Hydrogen	wt%	-	14	13.93	13.08	13.55	13.55	12.85
Dist. Nitrogen	wppm	-	25	30	596	200	147	640
Nitrogen	wppm	-	71	101	1881	545	495	2079
Ratio of Hydrogen to Carbon		-	1.94	1.93	1.8	1.87	1.87	1.78
BMCI		68	22.2	23.6	39.8	31.8	31.8	46.9
N-Heptane Insolubles	wt%	2.2	0.05	0.05	0.07	0.01	0.02	0.28
MCR	wt%	5.96	0.06	0.15	2.43	0.56	0.8	4.32

FIG. 3

(57) Abstract: Marine diesel fuel / fuel blending component compositions and fuel oil / fuel blending component compositions are provided that are derived from crude oils having high naphthenes to aromatics volume and/or weight ratios and a low sulfur content. In addition to having a high naphthenes to aromatics ratio, a low sulfur content, and a low but substantial content of aromatics, such fuels and/or fuel blending components can have a reduced or minimized carbon intensity relative to fuels derived from conventional sources. The unexpected ratio of naphthenes to aromatics contributes to the fuels and/or fuel blending components further having additional unexpected properties, including low density, low kinematic viscosity, and/or high energy density.

[Continued on next page]

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