

LIGHT OIL FUEL

The invention relates to oil processing, in particular to the composition of light oil fuel used for intermediate speed diesel engines in marine propulsion machinery.

The inventive light oil fuel may be produced based on straight-run distillates and residuum as well as on secondary products and their mixtures.

Marine oil fuel is known, which contains 36-42 mass % of straight distilled residual fuel, 42- 48 mass % of straight distilled diesel fuel, 10 – 22 mass % of coking gas oil or catalytic cracking gas-oil. (Fuel and Oil Chemistry and Technology, 1978, No. 3, pp. 28-30)

However, this type of fuel is characterized by unstable setting point when storing and by the unjustifiably high contents of distillate fractions up to 70 mass %.

Another type of marine power system fuel is known, with 5-30 mass % goudron, up to 25 mass % of long vacuum distillate 260 – 510° C, or products of long visbreaking residuum and long vacuum distillate 260 – 510° C, 20 – 25 mass % light catalytic cracking gas-oil, 15 – 40 mass % of hydrotreated diesel fuel, up to 0.05 mass % pour point depressant, and up to 100 mass % of straight residual fuel (RU 2155211, C 10 L 1/04, 2000).

High (up to 40 mass %) contents of hydrotreated diesel fuel and straight residual fuel with the high quality fuel limits its use.

The marine oil fuel with the following contents, in mass % is the closest to the invention:

Goudron	10-15
Light catalytic cracking gas-oil	15-30
Heavy catalytic cracking gas-oil	10-20
Hydrotreated diesel fuel	19-30
Oil fuel residuum	up to 100

(RU 2139912, C 10 L 1/04, 1/18, 1999)

However, such fuel contents do not demonstrate high stability which results in marine fuel segregation during its transport and storing; furthermore, this type of fuel contains a high amount of hydrotreated diesel fuel and straight residual fuel.

The objective of the invention is to increase fuel stability, expanding its assortment and increasing production of high quality fuels to be used in marine energy systems.

Summary

Accordingly, there is provided a light oil fuel containing residual fuel, goudron, light catalyst cracking gas-oil, heavy catalyst cracking gas-oil differs from available types by its contents of straight diesel fuel and heavy oil fraction visbreaking residuum with the following combination of components in mass %:

Oil fuel residuum	4-10
Goudron	2-10
Light catalytic cracking gas-oil	10-30
Heavy catalytic cracking gas-oil	5-10
Straight diesel fuel	8-10
Heavy oil fraction visbreaking residuum	up to 100

As a solution to this problem, the disclosure suggests the light oil fuel with the following contents, in mass %:

Oil fuel	4-10
Goudron	2-10
Light catalytic cracking gas-oil	10-30
Heavy catalytic cracking gas-oil	5-10
Straight diesel fuel	8-10
Heavy oil fraction visbreaking residuum	up to 100

At the same time, in some instances this fuel may contain up to 5 mass % of light coking gas-oil and 0.02 -0.1 mass % of pour point depressant based on ethylene and vinyl-acetate co-polymers.

The specific nature of the proposed technical solution is that in the invented fuel, straight oil residuum is replaced to the maximum by the residual products of advanced oil processing, and the use of straight diesel fuel instead of hydrotreated fuel.

The proposed combination of components makes it possible to increase the fuel stability when transporting and storing it, to extend the list and increase the production of high-quality fuels and effectively use low-quality products at oil-refining plants.

The proposed fuel is prepared by way of mixing its components.

To illustrate the essence of the proposed technical solution, five fuel samples were prepared.

The properties of components used in the fuel contents are listed in Table 1. Goudron visbreaking residuum or a mixture of goudron and residual fuel are used as the base for the proposed fuel.

The composition of prepared samples and quality indicators are listed in Table 2.

The data listed in Table 2 shows that the proposed fuel samples are in full compliance with the GOST standards for marine power system fuels.

Table 1

PROPERTIES OF COMPONENTS USED IN THE PROPOSED LIGHT OIL FUEL
SAMPLES

N	Indicator	Goudron visbreaking residuum	Light catalyst cracking gas-oil	Heavy catalyst cracking gas-oil	Straight diesel fuel	Goudron	Residual fuel	Light coking gas-oil
1	Setting point, ° C	10	Minus 12	16	Minus 13	30	21	2
2	Conditional viscosity, mm/s at 80 ° C, 100 ° C	6.6 3.4	1.20 ^x -	2.30 ^x -	1.32 ^{xx} -	42.1 16.2	8.0 3.93	2.5 1.84
3	Kinematic viscosity, mm/s at 80 ° C, 100 ° C	50.2 29.7	2.7 ^x -	14.8 ^x -	4.10 ^{xx} -	320 122.0	60.5 29.0	15.7 9.92
4	Mass sulfur share, % Coking ability %	2.6 12.1	1.20 0.02	2.32 0.38	0.75 0.008	2.56 10.2	1.7 7.3	2.0 0.5

x - at 50 ° C; xx - at 20 ° C

Table 2

COMPOSITION OF THE PROPOSED LIGHT OIL FUEL SAMPLES AND QUALITY INDICATORS

N	COMPONENTS	Composition of components, mass %				
		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1	Light catalyst cracking gas-oil	30	20	10	15	22
2	Heavy catalyst cracking gas-oil	10	15	5	6	10
3	Straight diesel fuel	10	8	20	15	13
4	Goudron	5	2	3	10	2
5	Residual fuel	5	10	4	4	10
6	Light coking gas-oil	3	-	-	-	5
7	Pour point depressant. Visbreaking residuum.	Up to 100	Up to 100	Up to 100	0.1 Up to 100	Up to 100
	QUALITY INDICATORS	INDICATOR VALUE				
1	Conditional viscosity, mm/s at 50 ° C, Grad. Viscosity	3.80	4.62	4.80	4.76	3.71
2	Kinematic viscosity	27.6	34.1	36.4	35.0	27.0
3	Setting point, ° C	-6	+2	+6	-3	-4
4	Sulfur mass share, %	1.90	2.04	2.07	2.05	1.91
5	Stability: - stain - general residue with chemical aging, %	1 0.02	2 0.06	2 0.09	2 0.05	1 0.05

PATENT CLAIMS

1. Light oil fuel containing residual fuel, goudron, light catalyst cracking gas-oil, heavy catalyst cracking gas-oil differs from available types by its contents of straight diesel fuel and heavy oil fraction visbreaking residuum with the following combination of components in mass %:

Oil fuel residuum	4-10
Goudron	2-10
Light catalytic cracking gas-oil	10-30
Heavy catalytic cracking gas-oil	5-10
Straight diesel fuel	8-10
Heavy oil fraction visbreaking residuum	up to 100

2. Light oil fuel under Claim 1 differs from other available types by its supplemental inclusion of up to 5 mass % of light coking gas-oil.

3. Light oil fuel under Claims 1 or 2 differs from other available types by its supplemental inclusion of pour point depressant based on ethylene and vinyl-acetate copolymers, in the amount of 0.02 – 0.1 mass %.