1) USS 27768-88 “Diesel fuel. Determination of cetane index calculation method”;

2) ASTM D976 “Standard Test Method for Calculated Cetane Index of Distillate Fuels”;

3) ISO 4264 “Petroleum products. Cetane index calculation of middle distillate fuels by the equation with four variables”.

Diesel fuels low-temperature properties are calculated using formulas developed by the authors. It is based on low-temperature properties dependence on the fractional composition and density of diesel fuels. Fractional composition and density were chosen as the initial parameters, as these indicators are always defined in the factory laboratories.

Created formulas verified using the factory data. These formulas have an average error not exceeding the experimental error in determining these parameters. The results of the cetane index and low-temperature properties calculation are shown in dialog box “Calculation results” (Figure 2).

By this means, the software suite “DIESEL +” can be used for control and planning the diesel fuels production, as it allows to calculate instantly and accurately diesel fuel cetane index and low-temperature properties.

Software suite “DIESEL +” error does not exceed the experimental error in the determination of these parameters.

DEVELOPMENT OF TRADE GASOLINE BLENDS

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The production of automobile gasoline connected with sophisticated complex of different technologies of oil refining. Despite this, the total world consumption of motor fuels is about 1.75 billion tons per year, including automobile gasoline – more than 800 million tons per year. Modern motor gasoline must meet the requirements that ensure an environmentally friendly and reliable engine operation, considering such a wide consumption of motor fuel in the world market [1].

The main property of motor gasoline is the octane number (ON), determined by two methods,

Table 1. «Regular-92», «Mid-grade-95» and «Premium-98» gasoline blends

RON	MON	RVP, kPa	Density, kg/m^3	Content of hydrocarbons, % mass.					
				P	I	N	B	A	O
«Regular-92»									
Reformate (23 % mass.)				FCC_2 (32 % mass.)					
Isopentane (2 % mass.)				n-butane (3 % mass.)					
FCC_1 (23 % mass.)				Isomerizate (1 % mass.)					
Alkylate (7 % mass.)				Straight run gasoline (9 % mass.)					
92.0	84.9	51.5	737.4	9.8	32.5	10.4	1.0	34.8	12.6
«Mid-grade-95»									
Reformate (12 % mass.)									
Isopentane (2 % mass.)				FCC_1 (33 % mass.)					
FCC_1 (30 % mass.)				C_9 aromatic hydrocarbons (10 % mass.)					
Alkylate (13 % mass.)				n-butane (3 % mass.)					
95.1	88.4	51.2	736.1	7.7	35.8	7.4	1.0	34.9	14.2
«Premium-98»									
Reformate (14 % mass.)				FCC_2 (21 % mass.)					
Isopentane (7 % mass.)				n-butane (1 % mass.)					
FCC_1 (35 % mass.)				Toluene (11 % mass.)					
Alkylate (7 % mass.)				MTBE (4 % mass.)					
98.0	90.0	49.3	736	5.7	34.3	7.1	1.0	35.3	13.6

Where P – is n-paraffins; I – is isoparaffins; N – is naphthenes; B – is benzene; A – is aromatic hydrocarbons; O – is olefins; RVP – is Reid vapor pressure

motor (MON) and research (RON).

In this work, we used the computer modeling system «Compounding». This system helps us calculated not only the octane numbers of different flows, but also analyze their properties. Based on the obtained results on properties and octane numbers of flow, blends of «Regular-92», «Mid-grade-95» and «Premium-98» gasoline were calculated (Table 1).

In conclusion, we can note that «Regular-92», «Mid-grade-95» and «Premium-98» gasoline, blended according to the developed formulation meet all the requirements of the Russian Federation gasoline quality standards.

References

1. *GOST R 51866-2002 «Motor fuels. Gasoline unleaded. Specifications».*
2. *TR TS 013 2011 «Requirements for automobile and aviation gasoline, diesel and marine fuel, jet fuel and fuel oil».*

STUDYING OF RAW MATERIALS COMPOSITION AND PROCESS TEMPERATURE ON THE PRODUCTION OF DIESEL FUEL OF DIFFERENT GRADES

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This paper considers the influence of feed composition and temperature in the reactor on the diesel fuel dewaxing process in terms of the grade of diesel fuel obtained.

The process of catalytic dewaxing is intended for improving various parameters of the hydrocarbon feedstock at low temperatures. One indicator is the limiting temperature of filterability. The limit of filterability temperature is the temperature at which 20 ml sample volume of diesel fuel does not have time to pass through the wire mesh in less than 20 s [1, 2].

The features of the dewaxing process: low pour point of the products; high stability of the products; good cetane properties of the products; constant product quality throughout the cycle; minimum viscosity reduction compared with other processes; flexibility, which allow to produce oil components and process oil distillates at the same unit [3].

Table 1. Composition of raw materials

	1, wt.%	2, wt.%	3, wt.%
N-paraffins C_{10}–C_{27}	16.46	14.86	19.19
N-paraffins C_5–C_9	2.22	0.60	1.15
Olefins	0.45	1.98	2.50
Naphthenes	38.34	39.85	38.91
I-paraffins	21.90	22.70	18.25
Aromatics	20.60	19.94	20.02

The calculations of the influence of feed composition and temperature on the diesel fuel dewaxing process were carried out using the mathematical model of catalytic dewaxing process based on the data derived from the refinery. The influence of tn-paraffins content and process temperature on the filterability limit temperature were studied. The grade of the fuel differs in terms of the filterability limit temperature.

The compositions of the raw material for research are presented in Table 1.

After studying the influence of n-paraffin content in the feedstock and determining the necessary temperature for the required fuel grade, we got functionality shown in Figure 1.

In the figure you can see that the dewaxing

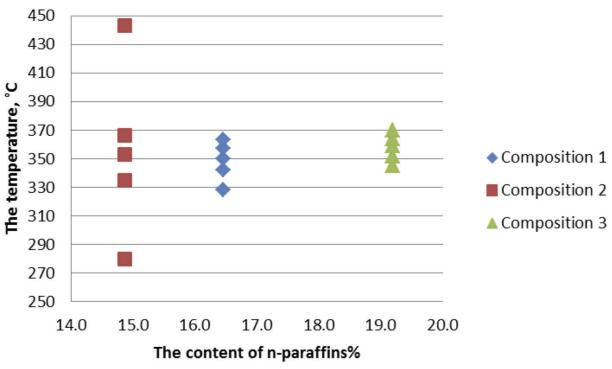

Fig. 1. *The temperature dependence on the content of n-paraffins*