The heat transfer coefficients at the water-metal and metal-air interfaces are calculated for all samples. The dependences of the heat transfer value on the geometrical parameters of the Ad-Hex (the thickness of the secondary heat-conducting surface, the height of the fins, etc.) are obtained. The values of heat transfer are measured and the correlation between experimental and calculated data is shown. Heat exchangers with various geometries have been tested under adsorption cooling/heating cycles.

It is shown that the approximation of a flat wall with straight fins of a constant cross-section can be used to evaluate the efficiency of using a given geometry for the AHT process.

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REGULARITIES OF THE DEPRESSOR CONCENTRATION EFFECT ON THE EFFECTIVENESS OF ITS ACTION FOR THE DIESEL FUEL OF VARIOUS COMPOSITION

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The use of diesel fuel (DF) is steadily increasing every year. High consumer demand is explained by a wide area of DF consumption: various types of transport, large-capacity vehicles, and different equipment. For most of Russia, where diesel fuel is used, harsh climatic conditions are characteristic, therefore, it is necessary to improve the low-temperature properties of DF. The most modern and effective way is to add a pour point depressant (PPD) in certain concentrations in DF.

The purpose of this work is to study the regularities of the PPD concentration influence on its effectiveness for DF of various compositions.

For the study, blends of two DF samples (DF-1 and DF-2) with PPD at concentrations of 0.5/1/2/5 c.u. (c.u. – concentration recommended by the manufacturer). The volume of c.u. is 0.2 ml per 100 ml of DF. The compositions of DF-1 and DF-2 were also studied. The research's results are introduced in table 1.

For the initial samples and the resulting blends, according to standards [1] and [2], the cloud point (CP) and pour point (PP), as well as the cold filter plugging point (CFPP), were determined. The results are introduced in table 2.

Based on table 2, for DF-1 and DF-2, an increase in the depressant concentration leads to a significant decrease in CFPP, and the CP values vary within the allowable measurement error. For

Table 1. The composition of DF-1 and DF-2 samples

Characteristic	Unit	DF-1	DF-2
Sulphur content	mg/kg	2865	516
Cetane index	points	50.7	51.4
Fractional composition			
initial boiling point	°C	149	118
10 % vol.		170	199
50 % vol.		242	270
90 % vol.		348	310
Paraffin content	% mass	60.29	53.26
Naphthenes content		17.55	24.64
Aromatic hydrocarbons content		22.16	22.09

Table 2. Low temperature properties of DF-1 and DF-2 samples

Samples	Concentration, common units														
	0			0.5			1			2			5		
	Characteristics, °C														
	CP	CFPP	PP	CP	CFPP	PP	CP	CFPP	PP	CP	CFPP	PP	CP	CFPP	PP
DF-1	0	0	–17	0	–1	–15	–2	–3	–20	–1	–5	–53	–1	–9	–48
DF-2	–12	–19	–22	–9	–20	–21	–9	–22	–24	–10	–27	–56	–9	–31	–60

the DF-1 sample, with an increase in concentration to 2 c.u. there is a significant decrease in PP, but at a concentration of 5 c.u. the PP increases by 5 °C, therefore there is a deterioration in PP. For DF-2, on the contrary, at a concentration of 5 c.u. the smallest value of PP is fixed.

Different trends in the influence of the PPD concentration possibly due to the difference in the compositions of DF. DF-1, according to table 1, contains more paraffin, which has the most influential on the low-temperature characteristics of DF. It is also known that depressants themselves in high concentrations are able to form spatial structures. Therefore, the increased content of paraffin and depressant in DF-1 at a concentration of 5 c.u. leads to the deterioration of PP.

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COMPARISON OF THE BIODIESEL FUEL PROPERTIES OBTAINED FROM PURE AND WASTE SUNFLOWER OIL

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Biodiesel is a relatively new type of fuel that can serve as an alternative to petroleum diesel fuel.

There are three generations of biofuels. This work study the properties of first generation biofuels (obtained from pure sunflower oil) and second generation biofuels (obtained from waste sunflower oil). The production of biofuels is based on a process called transesterification [1].

The methodology of obtaining biodiesel from pure and waste oil is the same. The difference is in the preparation of feedstock. The waste oil must be filtered.

The method of synthesis is as follows: the feedstock with a mass of 475.00 gram needs to be heated uniformly to a temperature of 45 °C with an electric stove and continuously stirring with a stirrer. Then dissolve an alkaline catalyst (sodium hydroxide) with a mass of 8.32 gram in ethyl alcohol with a mass of 138.00 gram and add the solution to the feedstock. The reaction time is 1 hour [2, 3].

Next, add 92.90 gram of glycerin to the resulting reaction blend, after the resulting blend is placed in a separating funnel on a day for settling.

One day later, the upper separated phase is taken and evaporated under vacuum at a temperature of 49 °C for 1 hour on a rotary evaporator, unreacted ethyl alcohol is distilled off.

Using this method, biodiesel was obtained from waste and pure sunflower oil. The yield of biodiesel