окраски при перекристаллизации снизился незначительно, однако существенна возросла температура плавления.

Было изучено влияние гидротермической обработки ТСП на концентрацию сернистых соединений в нафталиновой фракции. Содержание общей серы определяли методом энергодисперсионной рентгенофлуоресцентной спектроскопии на приборе HORIBA SLFA-20 по ГОСТ 32139-2019. Содержание серы в нафталиновой фракции после гидрирования ТСП уменьшилось с 525 ppm до 414 ppm.

Таким образом гидротермическая обработка ТСП приводит к снижению общей серы в нафталиновой фракции и позволяет извлекать из нее больше нафталина при улучшении качества последнего: повышается температура плавления, снижается показатель окраски по йодной шкале.

Работа выполнялась в рамках задания 4.3 «Разработка технологии комплексной каталитической переработки лесо- и нефтехимического сырья» подпрограммы «Создание новых наукоемких отечественных материалов различного функционального назначения на основе лесохимического и растительного сырья» ГПНИ «Химические процессы, реагенты и технологии, биорегуляторы и биооргхимия» Республики Беларусь на 2021–2025 годы.

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PREPARATION OF STABLE GASOIL/SUNFLOWER OIL FUEL MICROEMULSIONS BY USING IONIC LIQUID BASED SURFACTANTS AND INVESTIGATION OF THEIR EMISSION AND ENGINE PERFORMANCE

Diesel engine, due to its high thermal efficiency is the most widely used energy conversion tool to produce driving force in the industry, agriculture, transportation, etc. But, it releases a plenty of various kinds of pollutants such as oxides of nitrogen (NO_x), carbon (CO and CO_2) and sulfur (SO_x), unburned hydrocarbon (HC) and particulate matter (PM) into the environment [1,2]. Diesel fuels with dispersed water which is stabilized as tiny droplets has been found as a usable way to reduce the pollutants emitted from the exhaust of diesel engine [1,3]. The addition of the proper surfactant and/or co-surfactants is necessary to stabilize the water droplets in diesel fuel, hence, water in oil (diesel fuel) emulsion or microemulsion (ME) will be formed [4]. The surfactant selection for the fuel MEs is one of the challenging issues in this field, as it greatly affects the price as well as characteristic specifications of the produced fuel MEs. In the recent years, the use of ionic liquids which their properties can be adjusted by changing of the type of cation or anion; as surfactants has been considered [5].

A fuel ME based on blend of gasoil-sunflower oil (80:20), water, 1-butanol, and blend of Tween80, Span80 and 1-buthyl-3-methylimidazolium nitrate ([Bmim][NO_3]) ionic liquid as surfactant is formulated and optimized regarding amounts of co-surfactant, water and oil phase. The optimum results are obtained by using a blend of Span80:Tween80:[Bmim][NO_3], 70:26.25:3.75, respectively as surfactant. The fuel MEs exhibited upto 9 months stability on the bench. The dynamic viscosity and density of the optimum fuel ME were measured at the temperatures of 15, 20, 30 and 40°C, and compared with the corresponding values for the neat gasoil and blend of gasoil:sunflower oil (4:1 vol:vol). The values of the dynamic viscosity and density for the optimum fuel ME measured at various temperatures are detailed in Table 1.

Table 1 – Dynamic viscosity and density of the ME, neat gasoil and gasoil-sunflower oil blend at the different temperatures.

Temperature	Density (g/cm^3)			Dynamic Viscosity (mPa.s)		
°C	ME	neat gasoil	gasoil:sunflower oil	ME	neat gasoil	gasoil:sunflower oil
15	0.854660	0.837349	0.853857	5.8809	3.0750	7.6378
20	0.850868	0.833869	0.850364	4.9350	2.4400	6.5307
30	0.843208	0.826930	0.843383	3.5912	1.8500	4.9332
40	0.835441	0.819895	0.836412	2.7042	1.4600	4.1077

The size of the water droplets dispersed in the ME and also their size distribution at 25 °C was measured by dynamic light scattering (DLS) technique. As can be seen in Figure 1, the water droplets dispersed in the optimum fuel ME have a very narrow size distribution peak, with the sizes nearly 10 nm, which is providing the high stability for this fuel ME.

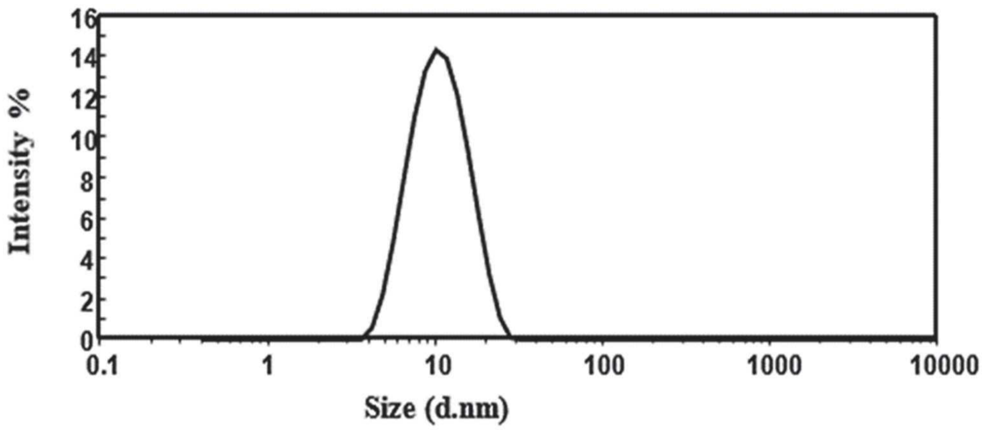

Figure 1 - DLS hydrodynamic size distribution graph of water droplets in optimum fuel ME

The engine combustion tests at various engine speeds and full load indicated that the brake specific fuel consumption (BSFC), torque, brake power and exhaust-gas temperature (EGT) are decreased in fuel ME compared to neat gasoil (Figure 2).

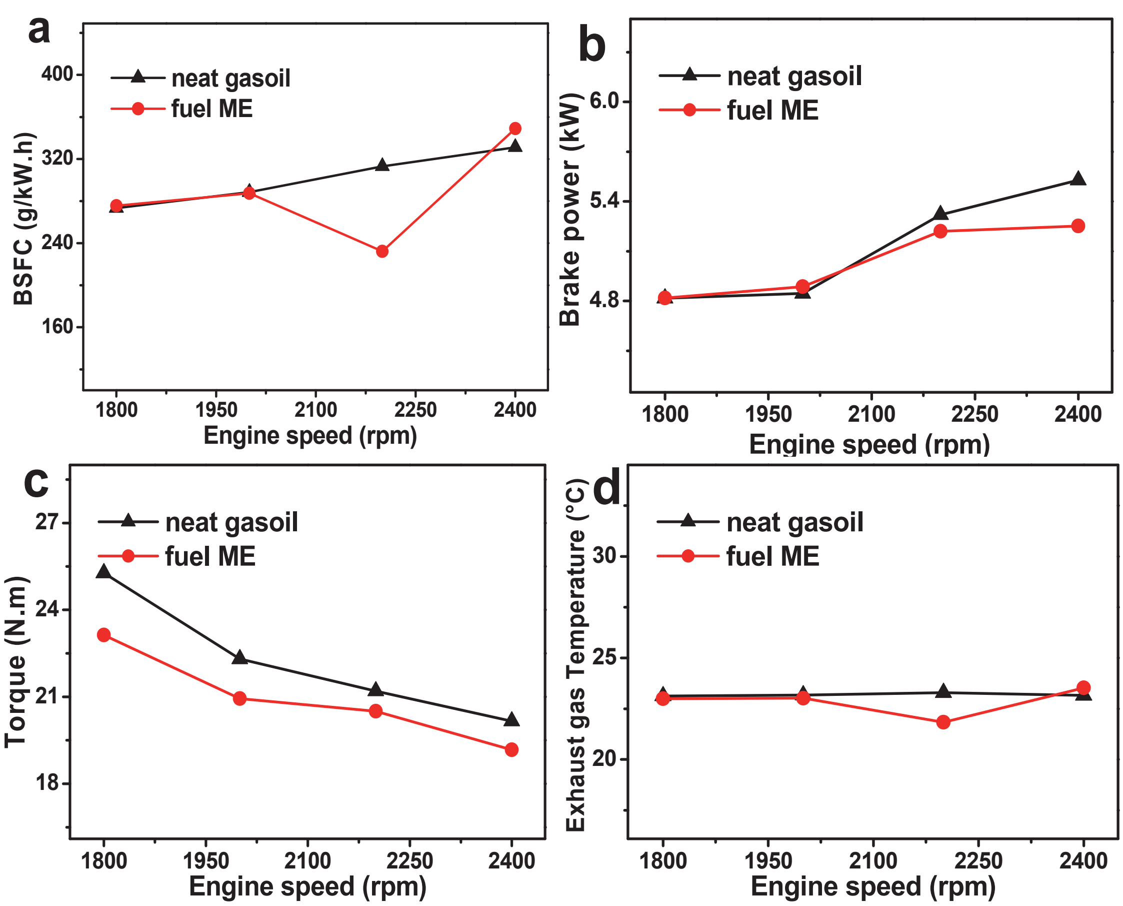

Figure 2 – a) BSFC, b) brake power, c) torque and d) exhaust-gas temperature (EGT) vs. engine speed for neat gasoil and optimum fuel ME

The engine combustion tests at various engine speeds and full load indicated a 4-5% reduction in the CO_2 and NO_x emissions for the optimum fuel ME compared to neat gasoil, while HC and CO emissions were increased by about 18.4% and 1.18%, respectively.

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USING ALKYL IMIDAZOLIUM BASED IONIC LIQUIDS AS SURFACTANTS TO PREPARE MICROEMULSION OF GASOIL/VEGETABLE OIL

Increasing of the global concern about the high energy consumption of the world, diesel fuel has entered into the researcher's center of attention. This energy carrier has turned to a major source of pollutants and suspended particles. Vegetable oils as a renewable fuel have good heating power and