process temperature rises with the increase of fuel grade. Also, the temperature of the dewaxing process rises by 15 °C with the increase of the n-paraffins content by 2 %. Maintaining of the optimal dewaxing process temperature depending on the feedstock composition allows producing a variety of fuels classes from 0 to 4 class.

Thus, it can be concluded that with an increase in fuel grade to achieve the desired low temperature characteristics, the temperature must be increased.

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MECHANICAL AND PHYSICAL PROPERTIES OF NORBORNENE-BASED COLOLYMERS

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Nowdays, major current focus on obtaining of polymers with improved properties. This production is impossible without the use of new monomers. One of the up-to-date and universal methods of the polymers synthesis is Ring Opening Metathesis Polymerization (ROMP). Ruthenium catalysts allow the using of such monomers as norbornene, dicyclopentadiene, cyclooctene and others with the preservation of the activity of functional groups [1].

At the present time, polymers based on norbornene and it's functional derivatives attract particular practical interest. Due to their unique properties such as transparency, chemical resistance, high adhesive and insulating properties [2]. One of such functional derivatives of norbornene is dimethyl esters of bicyclo [2.2.1] hept-5-ene-2,3-dicarboxylic acid (DME) was synthesized during this work. Initial reagents for DME are dicyclopentadiene and dimethylmaleate which are by-product of petroleum pyrolysis. According to Diels Adler's reaction, a mixture of isomers of exo, exo- and endo, endo-DME is formed in an amount of 40 and 60 % by weight, respectively.

A polymer based on a DME blend has a non-stereoregular linear structure of the polymer chain. In this connection, the material has insufficiently high physical and mechanical properties, and is soluble in chloroform and acetone. To increase the polymer strength, temperature stability and resistance to aggressive media, it is possible to add bi-functional co-monomers to DME having two norbornene fragments in their structure that open up during the ROMP process and form a reticulated polymer structure.

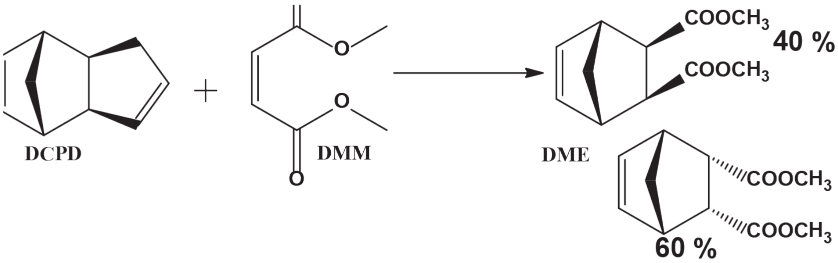

Fig. 1. *Scheme of synthesis of a mixture of exo, exo and endo, endo dimethyl esters of norbornene-2,3-dicarboxylic acid (DME)*

Table 1.

Concentration of comonomer C6D, mol%	E_{bend}, MPa	$E_{tensile}$, MPa	σ_{ts}, MPa	ε_{pp}, %	σ_{pp}, MPa	KCV, KJ/m^2	T_g, °C	Cross-linking degree %
PDME	1785±83	1725±5	44.0±0.4	163±19	28.2±1.2	5.5±0.2	100	0
1	1813±16	1897±65	44.1±0.3	90±26	29.9±0.3	5.2±0.1	104	91
1.5	1801±8	1975±12	44.3±0.4	56±9	31.0±0.5	5.2±0.3	113	92
2	1823±110	2003±22	44.5±0.2	36±8	31.8±0.1	5.4±0.5	115	93
2.5	1816±5	2020±10	44.3±0.1	21±9	31.7±1.0	5.5±0.3	116	95
3	1943±5	2040±47	44.7±0.6	14±6	31.9±1.0	5.4±0.8	134	97
3.5	1939±116	2083±50	44.6±0.3	11±2	32.0±2.2	5.6±0.3	145	96

The aim of this current study was to synthesis copolymers based on dimethyl esters of bicyclo [2.2.1] hept-5-ene-2,3-dicarboxylic acid and to analyze of their physical and mechanical properties.

Exo, exo-N, N'-hexylene-di (norbornene-2,3-dicarboxyimide) (exo-C6D) were used as a bi-functional co-monomer [3]. Exo-C6D was added to DME in an amount of 1 to 3.5 mol%, copolymerization was carried out in a mass of monomers. Here we used an original catalyst of the Hoveydy-Grubbs type II generation [4] in a weight ratio of catalyst: monomer of 1 : 15,000. The physical and mechanical properties of the samples with different concentration of co-monomer C6D are shown in Table 1.

According this data, it can be seen that the implantation of a bi-functional co-monomer led to an increasing of modulus of flexure and extensional modulus, the glass transition temperature as well. This is due to the formation of a crosslinked structure of co-polymers and an increase in the cross-linking degree. We can observe a decrease in the breaking elongation. With an increasing of the concentration of the implanting exo-C6D the tensile stress at yield and breaking strength do not change. Surprisingly, it was found that Izod impact strength did not change. This is due to the fact that the length of the linker has become larger and, consequently, the mobility of the crosslinked macromolecules of the copolymers has increased. Also, for the same reason, in the polymerization process, exo-C6D can undergo a Ring Opening Metathesis Polymerization not only with crosslinkable polymer chains but also interacting with itself, forming a linear polymer with cyclic fragments.

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EXERGY ANALYSIS OF MULTICOMPONENT DISTILLATION

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The aim of the exergy analysis is to estimate thermodynamical efficiency of industrial processes, locate exergy loss areas and improve technology.

The analysis of the exergy and energy efficiency of oil rectification schemes was the main objective of this work. Oil fractionation is the initial and one of the most energy demanding processes of any petroleum refinery. This is to say that even cases of slight energy efficiency increase of the process will lead to economic benefits.

The following technological schemes with different flow integration levels were taken for the analysis:

- Two column scheme without flows integration