lysts were used as reference catalysts for comparison. The volume of the catalytic cartridge was kept constant in all experiments, though in case of MFC the mass amount of the catalyst in this volume was much lower (less than 150 g per l of the bed) than that for the conventional catalysts.

The observed dependence of the apparent reaction rate upon temperature for different types of the catalyst packing is given in Fig.1. Comparison was made for temperature region above 200 °C, where the reaction was limited by the external mass transfer.

It is seen that the MFC in the form of cartridges with corrugated structuring wire mesh demonstrates the excellent volume performance competitive to that of the monolith catalyst (Fig.1a). At the same time, all MFCs look much more efficient than conventional catalysts in terms of apparent reaction rate per unit catalyst mass (Fig.1b). MFCs may be applied for intensification of many catalytic processes.

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QUALITY MONITORING OF DIESEL FUEL AVAILABLE AT FILLING STATIONS OF TOMSK CITY

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Diesel is one of the most popular types of motor fuel. Currently, diesel fuel is an important part of Russian transport system because most of the trucks and agricultural vehicles consumes diesel [1].

Basic physico-chemical and operational properties of diesel fuel produced in Russia are governed by three basic standards: USS 305-82, USS R 52368-2005 and Technical Regulations of the Customs Union "Requirements for automobile and aviation gasoline, diesel and marine fuel, jet fuel and heating oil". The most stringently controlled characteristics of diesel fuel are: cetane number, flash point, density, kinematic viscosity and low temperature properties (cloud point, cold filter plugging point, pour point).

Cetane index is the most important characteristic of diesel fuel used in internal combustion engines. Optimal performance of modern engines is achieved by using of diesel fuel with a cetane index from 45 to 55 points. If cetane index of diesel fuel is less than 45 points, the combustion delay (the time between the beginning of fuel injection and its ignition) is increased, and the pressure rate in the combustion chamber rises, thereby engine wear is increased. If cetane index is higher than 55 points, the combustion efficiency is reduced, and smokiness of diesel fuel as well as its consumption rises [2].

Experimental determination of cetane index is a multi-step and time-consuming process. That is why determination of cetane index in this study was performed using calculation methods. Allthe calculations were carried out basing on the international standard ISO 4264 where cetane index is calculated by the following equation:

$$CI = 45.2 + 0.0892 \cdot T_{10N} + (0.131 + 0.901B) \cdot T_{50N} + (0.0523 - 0.42B) \cdot T_{90N} + [0.00049 \cdot (T^2_{10N} - T^2_{90N})] + 107B + 60B^2;$$

$$T_{10N} = T_{10\%} - 215;\ T_{50N} = T_{50\%} - 260;$$
$$T_{90N} = T_{90\%} - 310;$$

$$B = [\exp(-0.0035 \cdot D_N)] - 1; \; D_N = D - 850.$$

CI – cetane index, points; $T_{10\%}$, $T_{50\%}$, $T_{90\%}$ – boiling point of 10%, 50%, 90% fraction, °C; D – fraction density at 15 °C, kg/m³.

For this study, 5 diesel fuel samples were purchased at various filling stations in Tomsk. Samples were assigned with numerical codes. Fractional composition of purchased samples was determined experimentally using laboratory device of fractional distillation (Table 1).

Table 1. Fractional composition of diesel fuel samples

Numerical codes	$T_{10\%}$	$T_{50\%}$	$T_{90\%}$
	°C		
1	219	269.5	330
2	216	279	331
3	217	275.5	322
4	193	264	340
5	216	269	330

Table 2. Comparison between required and experimental characteristics

Numerical codes	Cetane Index USS R 52368-2005	Cetane Index experimental value	Density USS R 52368-2005 at 15 °C	Density Experimental value at 15 °C
			kg/m³	kg/m³
1	>46.0	50.04	820–845	843.8
2		48.26		851.0
3		47.16		852.0
4		47.27		843.9
5		49.57		844.1

Purchased samples were then checked for the compliance with USS R 52368-2005 "Fuel diesel Euro. Specifications" by such parameters as density and cetane index. The results are presented in Table 2.

It was found that all purchased samples meet the requirements in terms of cetane index . However, it can be seen from Table 2 that samples No. 2, 3 do not meet the requirements for density.

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SYNTHESIS OF VANILLOLOSIDE, CALLERYANIN, AND THEIR DERIVATIVES

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Natural aryl glycosides are biologically active substances which can be isolated from variety of plants and are attractive for utilizing in medicine. For instance, vanilloloside 1 was isolated from *Nelumbo nucifera* stamens [1], and others, and has specific activity against cancer cells, such as HeLa (cervix cancer) and MCF-7 (breast cancer) [2], and is efficient at inhibiting fermentative activity of acetylcholinesterase and, thereby, could potentially be utilized to cure Alzheimer [1]. Calleryanin 2 was isolated from *Pyrus Calleryana* leaves and shows scavenging and antioxidant activity [3]. Its derivative 7-O-*trans*-caffeoylcalleryanin 5 was isolated from *P. Calleryana* [5] and may have the similar activity.

On the first step of the synthesis we performed glycosylation of vanillin 1a and protocatechuic aldehyde 2a with acetobromoglucose (ABG) in two different systems. Obtained aldehydes 1b and 2b were reduced with $NaBH_4$ in conditions of phase