



29 May - 1 June 2016, Istanbul, TURKEY

Abstract Book

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ISBN

978-605-89885-6-9

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GREEN INTEGRATED SEWAGE TREATMENT TECHNOLOGY OF AIRPORT

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SUMMARY

There is proposed a new environmentally friendly technology of airline enterprises' sanitary sewage water treatment, which allows to improve quality of the treated sewage water, to diminish harmful impacts on environment during sewage sludge utilization and to obtain additional amount of alternative energy sources.

Keywords: airline enterprise, sewage water, sludge utilization, digestion, alternative energy sources, working bioreactor, which can provide all proposed improvements in the technology. Expected results of organizing additional water treatment in bioreactors are: decreasing of pollutants' amounts, which are released into environment with sewage waters; obtaining raw materials (microalgae) for producing motor fuel, reducing amount of CO₂, which is released into the atmosphere. To make digestion processes more efficient there is proposed technology with division of the process into four consecutive stages: hydrolysis, acetogenesis, acidogenesis, and methanogenesis.

According to the technology each stage takes place in separate isolated capacity. In each capacity there should be created optimal parameters of medium for acting on this stage specific groups of bacteria. Results of researches have shown optimal conditions for each stage. They are different. For hydrolysis there is proposed intensification of organic compounds destruction by using intensified ultrasonic cavitation. For acidogenesis – adding hydrogen for increasing its partial pressure in the reactor. For acetogenesis – immobilization of working bacteria, adding CO₂ and increasing pressure in the reactor. For methanogenesis – also bacteria immobilization, adding different microelements and biostimulators. Expected results of new organization of digestion process are: shorten the process of digestion from 15 to 3 days; increasing the output of biogas per one volume unit of sludge; increasing content of methane in the biogas from 60% to 95%; obtaining marketable CO₂; obtaining safe organic fertilizer, which does not decay and does not contain pathogenic microorganisms.

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RESEARCH ANTIKNOCK RATING OF NEW COMPOSITION FOR AVIATION GASOLINE

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SUMMARY

Traditionally components of aviation gasoline are produced by various technological processes. The basic fractions of aviation gasoline are: gasoline straight distillation of crude oil, catalytic reforming, catalytic cracking and blending. The main components are high-octane alkylate, technical isooctane, toluene, propanol and alkyl benzene, ethyl fluid. The main indicator of the quality of gasoline is its antiknock rating. This ability to burn fuel without detonation of a reciprocating engines with spark ignition, which is estimated octane number and describe the operational and environmental characteristics of transport. To provide antiknock rating and high octane number for aviation fuel add different antiknock additives. The most effective now is Tetraethyl Lead (TEL).

Today all the known brands of aviation gasoline used TEL as antiknock additive good despite the toxicity. Therefore, development of new environmentally safe aviation gasoline is topical modern problem that needs solving.

One solution to this problem is the introduction of the aviation gasoline instead of tetraethyl lead aliphatic alcohols, for example, ethanol, methanol, buthanol.

Their impact on gasoline are known worldwide. With the addition of even 10% ethanol gasoline enriched with oxygen, which promotes more complete combustion and reduce emissions of carbon monoxide by 30%. Also, a decrease toxic emissions by 30% and emissions of volatile organic compounds – more than 25%. Using a mixture of gasoline and ethanol, E10, allowed all the major car manufacturers, while improving engine performance by adding 2,3 octane units to detonation resistance fuel prevents overheating, acts as antifreeze fuel system and does not cause contamination of the fuel injectors.

This was the main motivating factor for the performance of our research. We created a hydrocarbon mixture, consisting of 43.0% of gasoline hydrotreatment of catalytic cracking, 40.0% of gasoline of catalytic reforming, 14% of raffinate and 3% toluene (as a Base Gasoline Mixture, BGM). In this base mixture we have determined the content of lead additives in a concentration of 0,0005 g per dm³. It is absence. This original motor octane number (MON) was 80,4.

To improve and modifications of this base gasoline mixture 5%, 10%, 15% ethanol we are added. Then investigated antiknock rating of new gasoline mixture. Methanol as a representative of aliphatic alcohol was excluded as the a highly toxic element. The results are presented in Table 1.

Table 1. Impact modified base gasoline mixture (adding aliphatic alcohol - ethanol) in octane number

№	Research sample	MON
1.	Base Gasoline Mixture (BGM)	80,4
2.	BGM + 5% ethanol	81,3
3.	BGM + 10% ethanol	82,7
4.	BGM + 15% ethanol	84,6

According to research results (Table. 1), the addition of 15% ethanol increases the octane number almost 5 units from BGM.

These are our first results obtaining environmental aviation gasoline.

While this is not enough, interest is butanol. Further researches will be linked to the modification of BGM by other high-octane components (or additives) up to the level of MON 100.