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New Approaches To Cleaning Exhaust Gases Of Internal Combustion Engines

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Annotation. By adding 5-6% of an alternative fuel - Brown's gas to the main fuel for the complete combustion of the fuel used in vehicles, in the cylinders of internal combustion engines, it was possible to reduce fuel consumption by 25-35%, and the amount of carbon dioxide by an average of 60-70% . Due to the use of a new collapsible spark plug instead of a conventional spark plug, it was possible to reduce fuel consumption by 15-30%, the amount of carbon monoxide by 40-50%, the amount of unburned hydrocarbons by 30-40%.

Key words: toxic component, ecology, fuel consumption, exhaust gases, carbon monoxide.

Experts and scientists are seriously worried about the increasing energy and environmental problems on Earth in recent years. The main reason for this is the excessive use of energy for the purposes of economic development. In the next four decades, more fossil fuels were extracted than in all of human history. Every year, due to production and use, the reserves of natural resources such as oil, natural gas, coal, and uranium are rapidly decreasing, causing serious concern to humanity.

In order to accelerate economic development, development and a democratic process that does not harm the environment, the world needs an environmentally friendly and cheap source of energy. It is desirable to solve this problem with an entrepreneurial approach, changing technologies and supporting local initiatives.

Petroleum and natural gas fuels, which are widely used in vehicles, are not only being used indiscriminately, but the toxic substances contained in the exhaust gases released as a result of burning them are indiscriminately poisoning the population and the environment [1, 2].

It is known that when the fuels used in vehicles were completely burned in the cylinders of internal combustion engines, no toxic substances were released into the environment, but the majority of vehicles on the streets today are discharged without complete combustion. As a result, more than 200 types of toxic substances are released from their extinguishers, and they are several tens of times more than the exhaust gases released from the pipes of boiler houses and factories.

Therefore, the use of fuel-efficient, environmentally friendly and cheap energy sources in vehicles is one of the most important problems facing the world today.

20-30% in a carburettor engine adjusted to the optimum setting, 5-10% in an injector engine, 10-15% in a gas-powered gasoline engine, 15-20% in a diesel engine are released into the atmosphere through the extinguisher without burning. Catalytic neutralizers are installed in the exhaust to trap these fuel particles in the exhaust gases. While these neutralizers trap fuel particles and reduce the toxicity of exhaust gases, they lead to excessive fuel consumption and reduced engine power [3, 4].

Today's ever-increasing prices of oil and gasoline require efficient use of fuel. For this, it is necessary to improve the composition of the fuel and air mixture entering the engines. As a result, we can reduce fuel consumption and the toxicity of exhaust gases.

The biggest challenges in complying with the current and prospective standards for the toxicity of exhaust gases are related to the reduction of NOx emissions, the reduction of emissions of CH and CO in the starting, heating and idle modes [5, 6].

The following measures are recommended to reduce the toxicity of exhaust gas detoxification gas:

- Improving the quality of engine production by improving technological processes and, first of all, by strengthening production tolerances for the production of parts that make up the combustion chamber, fuel supply system, water intake pipes and ignition system. Improvement of starting, heating and idle

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systems, use of forced idle economizer, etc. The best results in reducing exhaust gas toxicity are obtained by using a gasoline injection system.

- The use of gasoline with a low content of tetraethyl lead, the transition to gaseous fuels and hydrogen.
- Recirculation of used gases. If part of the exhaust gas from the exhaust gas detoxification system is directed to the intake pipe, then the concentration of fuel in the charge will decrease. This, along with the relatively high heat capacity of combustion products, leads to a decrease in the maximum circulation temperature and oxygen concentration in the charge, which helps to reduce the formation of NOx and reduces their concentration in the exhaust gas, depending on the load, by 40 ... 50%. Experiments show that for such a decrease in NOx concentration, it is necessary to supply treated gas to the intake system in an amount of up to 20% of the amount of air.
- Decontamination of filled gases is a radical way to reduce OG toxicity. Catalytic converters are most commonly used for car engines, in which special substances (catalysts) accelerate the oxidation of CO and Ch, as well as reduce NOx.
- The catalytic converter used to neutralize the three components (CO, CH and NOx) is called three-way or dual-function, its efficiency largely depends on the composition of the mixture in which the engine is running. Figure 1 shows the variation of conversion ki, the toxic components of the exhaust gas from the composition of the mixture.

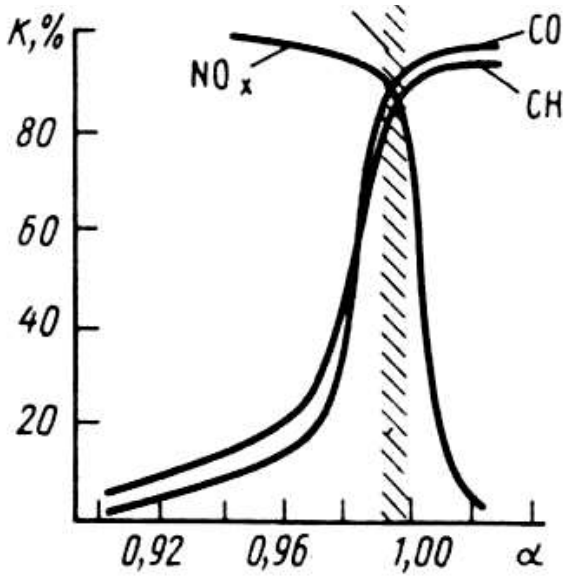

Figure (1): Effective operating zone of the three-way neutralizer

When there is a high conversion of all three main toxic components at the same time, i.e. when the amount of oxygen released during NOx reduction is sufficient for CO and oxidation, there is a very narrow range of mixture compositions near α= 1.0. Maintaining the composition of the mixture in such a narrow range can be done mainly due to the use of supply systems with electronic control on the signal of the oxygen sensor (λ-zond) [7-9].

The Institute is conducting work in these areas and as a result of their introduction, high technical, economic and environmental efficiency is achieved. For example, by adding 5-6% of alternative fuel - Braun's gas to the main fuel, it was possible to reduce gasoline fuel consumption by 30-35%, diesel fuel consumption by 25-30%, and compressed gas consumption by 15-20%. Also, the amount of carbon monoxide CO in the processed gases decreased by 60-70% on average, and the amount of unburned hydrocarbons decreased by 40-50% [10-12].

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Figure (2): Bulk spark plugs

By using a new composite spark plug instead of a conventional spark plug, fuel consumption is reduced by 15-305%, the amount of carbon monoxide is reduced by 40-50%, and the amount of unburned hydrocarbons is reduced by 30-40% [13, 14, 15, 16].

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