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## AUTOMOTIVE ENGINES - MAIN SOURCES OF ENVIRONMENTAL POLLUTION

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**Annotatsiya.** Ushbu maqolada avtomobil transporti tomonidan chiqariladigan zaxarli moddalarning atrof-muhitga zararli ta'sirini ko'rilgan, avtomobil dvigatellaridan chiqadigan zararli chiqindilar darajasini pasaytirish bo'yicha samarali choralarni ishlab chiqarish yo'llari ko'rsatilgan. Dunyoda va O'zbekiston Respublikasidagi ekologik vaziyatga umumiy tahlil berilgan.

**Kalit so'zlar:** ekologik muammolar, atrof muhitning ifloslanishi, zaharli moddalar, ichki yonish dvigatellari, chiqindi gazlar, uglevodorod oksidi, oltingugurt, uglevodorodlar, azot, Eurostandard, avtomobil transporti.

**Аннотация.** В данной статье рассматриваются вопросы вредного влияния токсичности автомобильного транспорта на окружающую среду, указываются действенные меры по снижению уровня вредных выбросов автомобильными двигателями. Дается обзорный анализ экологической обстановки в мире и в частности в республике Узбекистан.

**Ключевые слова:** экологические проблемы, загрязнение окружающей среды, токсичные компоненты, двигатели внутреннего сгорания, отработавшие газы, оксиды углеводородов, серы, углеводород, азот, Евростандарт, автомобильный транспорт.

**Abstract.** This article discusses the harmful effects of the toxicity of road transport on the environment, indicates effective measures to reduce the level of harmful emissions from automobile engines. An overview analysis of the ecological situation in the world and in particular in the Republic of Uzbekistan is given.

**Keywords:** environmental problems, environmental pollution, toxic components, internal combustion engines, exhaust gases, oxides of hydrocarbons, sulfur, hydrocarbons, nitrogen, Euro standard, road transport.

**Introduction.** With the accelerated development of industrial and agricultural production, transport and other sectors of the national economy, environmental protection has become one of the most important tasks of all mankind, the solution of which is inextricably linked with ensuring the protection of human health and the environment. Therefore, reducing air pollution with toxic substances that are emitted



by industrial enterprises and road transport is one of the most important problems for both developed industrial countries and developing countries [1,2,3,7,15].

**Literature review.** The problem under consideration is of worldwide importance, as a result of which many scientists conduct scientific research to protect the environment of the universe. Many domestic and foreign scientists are engaged in the issues of pollution and protection of the atmosphere from harmful emissions by road transport. The scientific works of the following scientists deserve attention: academicians A.U. Salimov. and Nigmatov S.S., Honored Scientist of the Republic of Uzbekistan. Doctor of Technical Sciences, Professor Kadyrov S.M., Doctor of Technical Sciences, Professor Mukhitdinov A.A., Doctor of Technical Sciences, Corresponding Member of the Russian Academy of Sciences, Doctor of Biological Sciences, Professor Yablokova A. V., Doctor of Technical Sciences, Professor Gorbunov V.V., Doctor of Technical Sciences, Professor Kamensky E.N., Wilkinson David M., Tobey Ronald C., Mitman Gregg, etc. It should be noted that 11 On March 2019, over 4,700 delegates from around the world gathered in Nairobi, Kenya to discuss climate change, consumption and production, protecting the oceans from plastic pollution, food loss and more. They take part in the work of the UN Environment, the world's largest environmental protection body. The Assembly was attended by 252 scientists from around the world [13].

**Research Methodology.** The atmosphere is polluted by emissions, including organic, inorganic, radioactive and other types of compounds, various gases, vapours, particles of solid and liquid substances in quantities exceeding sanitary standards.

As you know, intracity and intercity transportation is carried out mainly by road, where piston internal combustion engines are used as a power plant, which are sources of increased environmental pollution. substances from transport make up the majority of all total emissions. At the same time, the concentration of toxic components of exhaust gases (OG) in the air often exceeded the maximum permissible values by 10-15 times[1,2,3].

Air pollution from exhaust gases from motor vehicles not only affects human health but also causes direct economic damage. Toxic substances of exhaust gases contained in the air affect the flora and fauna, the soil. Significant damage is caused to buildings, structures, monuments of history and culture, various building materials and, along with this, the processes of corrosion of metals are accelerated. So, for example, in industrial areas, the corrosion rate of iron and its alloys increases 20 times, and aluminium - 100 times compared to rural areas [1,3].

Along with various natural phenomena leading to air pollution, human activities associated with the development of natural resources, the development and improvement of industry, agriculture, construction, transport and other areas are becoming increasingly important in this process.

Due to a lack of knowledge, imperfection of the equipment and technologies used, the lack of forecasting the results of decisions made or for other reasons, human economic activity is accompanied by undesirable processes, in particular, the emission of harmful substances into the atmosphere by enterprises and vehicles. Polluting the atmosphere, damage the environment and human health.

The relationship between natural and industrial harmful substances that enter the atmosphere and the relationship between harmful emissions from various sources are presented in Table 1. The problem of reducing air pollution has long crossed the borders of individual states and even entire continents, has acquired an international character and has become practically common for all countries of the world. Harmful substances that enter the atmosphere are carried by air currents to vast spaces, poisoning the entire animal world and plants.

The use of power plants with internal combustion engines (ICE), consuming liquid petroleum motor fuels, in industrial energy, in sea, river, motor transport, in agriculture, small aviation, leads to severe environmental pollution.

Hundreds of millions of internal combustion engines are in operation in the world as power plants, which consume more than 1 billion tons of oxygen for fuel combustion, while emitting hundreds of millions of tons of carbon monoxide and tens of millions of tons of nitrogen oxides, sulfur and unburned hydrocarbons [1,3]. For example, if we consider the ratio of harmful emissions into the atmosphere for the year on a global scale (Table 1), then the main amount of harmful emissions falls on road transport.

Table 1

**Ratios of harmful emissions per year in various countries and around the world, million tons**

Emissions	CO	H C	O <sub>3</sub>	NO <sub>x</sub>	SP*	S	Total
Intheworld :							
natural	0,21	30	-	-	1	2000	
duetohumanactivities	200,	50,	14	53,	2	469,	
indifferent countries							
duetohumanactivities	113,	31,	30	25,	1	213,	
Roadtransport	85,1	10,	0,	7,4	0,	104,	
alltransport	94,5	12,	0,	10,	1,	119,	
stationaryinstallations	1,3	1,7	24	14,	5,	47,3	
Industry	12,0	11,	4,	0,9	6,	35,8	
Uncontrolled	5,4	5,0	-	0,1	0,	11,3	

\* SP - solid particles.

Currently, ICEs generate more than 85% of the energy consumed on Earth, with the main share of engines being traditional piston engines. And one of the most serious sources of environmental pollution is poisonous gases (exhaust gases) from automobile engines and other vehicles containing toxic substances.

In 2012, emissions of pollutants from mobile sources in Uzbekistan amounted to more than 2.5 million tons. At the same time, the total intake of lead into the atmosphere from vehicles is estimated at 4 thousand tons, including 2.16 thousand tons from trucks transport [2,3].



The relative share of harmful substances by road transport in the total emission in some large cities of the world, including for the republics of Central Asia, are given in Table. 2.

**Table 2****Emissions from automobile engines in various cities around the world.**

City	CO	CH	NO <sub>x</sub>
Moscow	96,0	64,0	33,0
St. Petersburg	88,0	79,0	32,0
Madrid	95,0	90,0	35,0
Stockholm	99,0	93,0	53,0
New York	97,0	63,0	31,0
Tokyo	99,0	95,0	33,0
Tashkent	95,0	81,0	46,0
Nur-Sultan	96,0	78,0	51,0
Frunze	94,0	72,0	48,0

The number and composition of toxic components in the exhaust gas of engines depend on the type of engine, design and control factors, the degree of perfection of the working process, operating modes of the engine, its technical condition, operating conditions and other factors.

In auto-tractor engines, liquid motor fuel is mainly used, which contains carbon, hydrogen and small amounts of oxygen, nitrogen and sulfur, therefore, with ideal combustion of fuel with air, the combustion products should contain only N<sub>2</sub>, CO<sub>2</sub>, H<sub>2</sub>O. However, the actual composition of the exhaust gas is much more complicated.

Currently, the progressive society of mankind is conducting global research work to dramatically reduce the number of harmful substances in the exhaust gases of cars. The results of such studies have shown that there are several ways to reduce the number of harmful substances in exhaust gas. One of the most effective methods for solving this problem is the emergence of a strong, authoritative and effective document Euro standard, which sets strict requirements for the environmental friendliness of fuel.

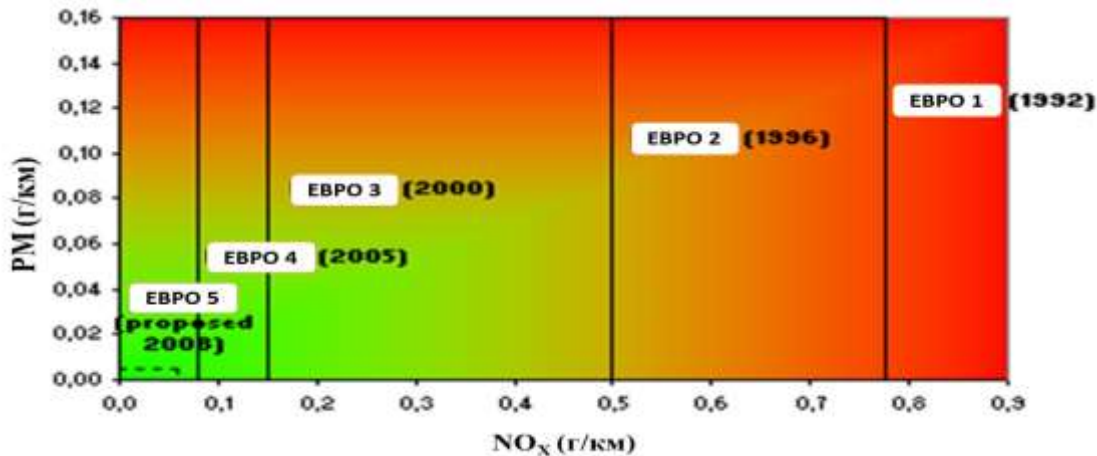
Standardization is an important aspect of any production, and especially fuel production since non-compliance with established requirements can have a devastating effect not only on the vehicle where it will be used but also on the entire environment, including human health.

With the development of oil refining, the requirements for produced gasoline and diesel fuel and the corresponding standards are invariably tightened, while several parties can set and change them at once, in particular:

- Car manufacturers to ensure the stable operation of the engine and related systems during the established service life. Fuel producers relying on the modern capabilities of the refining industry.

- The government, which establishes the procedure for transportation and storage of fuel, as well as requirements related to its environmental friendliness.

- To improve the environment in the EU countries, the Euro certification procedure has been adopted since 2001. It is aimed at regulating the level of the number of harmful substances that are contained in the car's exhaust gases to the maximum allowable standards. The requirements of the European Standard for the environmental friendliness of automobile fuels are becoming more stringent from year to year (Fig. 1).



**Fig.2. Stages of toughening the requirements of the European Standard for the quality of automotive fuels (for example, diesel fuel) [2,3,4,5].**

The Euro certificate is an environmental certificate confirming the compliance of the vehicle imported into the country with the requirements of the Technical Regulations. Thus, the Euro policy is aimed at reducing the content of unwanted and harmful substances in exhaust gases. Therefore, many developed countries adhere to Euro standards, including the Republic of Uzbekistan currently adhere to Euro-4 standards[2,3].

From January 1, 2022, the import of motor fuel of an environmental class below Euro-3 is prohibited, and from January 1, 2023 - motor fuel of an environmental class below Euro-4.

This is stated in the presidential decree "On approval of the concept of environmental protection of the Republic of Uzbekistan until 2030".

According to the document, it is prohibited:

- from January 1, 2020, the commissioning of new capacities for the production of motor fuel of an ecological class below Euro-4;

- from January 1, 2022, premises under the customs regime "temporary import" and "release for free circulation (import)" of motor fuel of ecological class below "Euro-3", and from January 1, 2023 - motor fuel of ecological class below "Euro-3" four";

The Cabinet of Ministers was instructed to approve within two months the procedure for environmental certification of new wheeled vehicles of categories "M" and "N" imported into the republic for compliance with the requirements of the environmental class [2,3].

At the present stage of the development of engine building, comprehensive studies are being carried out to improve the quality of fuel to improve the combustion



process, the economy of the engine and, of course, reduce harmful emissions from the engine [11].

One of the ways to improve the quality of gasoline is to reduce the content of ethyl compounds in the fuel since lead compounds do not burn and are emitted with exhaust gases into the atmospheric air. Currently, unleaded gasoline is already widely used in many countries.

**Analysis and results.** The results of the above work allow us to draw the following conclusions:

1. The problem of environmental safety of road transport and the reduction of harmful emissions is the most important task of our time, the solution of which is possible both by improving the engine design and improving the quality of fuel.

2. To improve the environment in the EU countries, the Euro certification procedure has been adopted since 2001. It is aimed at regulating the level of the number of harmful substances that are contained in the car's exhaust gases.

3. The quality of the fuel used has a decisive influence on the environmental performance of road transport.

4. When using fuel that meets Euro requirements instead of standard domestically produced fuels, the amount of weighted average harmful emissions into the atmosphere is significantly reduced.

**Conclusion.** The development of new types of gasoline and diesel fuel is primarily due to the tightening of requirements for the environmental safety of the petroleum products used. They directly affect the composition of the fuel, or rather, the number of harmful substances contained in it and formed as a result of its processing.

Currently, in the Republic of Uzbekistan, as in other developed countries, they adhere to the norms of the Euro standard.

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