EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

PROTECTING THE ENVIRONMENT FROM AUTOMOBILE EXHAUST GASES

Abdirashidov Aslidin Abdumuhammad o‘g‘li
PhD, Termez State University of Engineering and Agrotechnology

Rasuli Khaluddin
Student, Termez State University of Engineering and Agrotechnology

Abstract
The transport-road complex is a source of environmental pollution. Vehicles have the highest indicators among the factors influencing the change of air. 89 percent of the 35 million tons of harmful waste is the waste of automobile transport and road construction enterprises. In order to reduce the harmful effects of the car, it is necessary to find solutions that satisfy the relevant conditions of the flow of matter and energy exchange between the car transport complex and the environment. Transport is one of the main sources of noise in cities and contributes to thermal pollution of the environment.

Keywords: Automobile, level of automobileization, ecology, atmosphere, dust particles, heavy metals, engine exhaust gases, relative cleanliness indicators.

Introduction

The transport and road complex is a powerful source of environmental pollution: 89% of the million tons of harmful waste generated are waste from road transport and road construction enterprises. At the current stage of industrial development, the issue of solving environmental problems is an integral part of the entire world economic policy. One of the sources of environmental pollution is road transport. It also consumes fuel, neutralizes toxic substances, and uses special motor oils that are not effective enough. Especially in cities, the concentration of oxides in the air is 8-10 times higher than on the road. In order to reduce the negative impact of automobiles on the environment, work is being carried out to create new engine models, improve the operation of engines, select optimal modes, and optimize the parameters of the supply and ignition systems. One of the main ways to reduce

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

toxic substances is to correctly adjust fuel consumption in cars and control exhaust gases.

Table-1The composition of gases used in automobile engines.

Exhaust gas component	Amount by volume, %		Note
	Gasoline engines %	Diesel engines %	
Nitrogen	74.0-77.0	76.0-78.0	Non-toxic
Oxygen	0.3-8.0	2.0-18.0	Non-toxic
Water vapor	3.0-5.5	0.5-4.0	Non-toxic
Carbon dioxide	5.0-12.0	1.0-10.0	Non-toxic
Carbon monoxide	0.1-10.0	0.01-5.0	Toxic
Aldehydes	0-0.2	0.001-0.009	Toxic
Sulfur oxide	0-0.002	0-0.003	Toxic
Soot g/m^3	0-0.004	0.01-1.1	Toxic

One of the serious concerns facing humanity in the 21st century is environmental pollution and the harmful effects of various waste gases released into the atmosphere on human health. Indeed, ecological problems know no borders; they give rise to transboundary issues between countries and, in turn, negatively affect socio-economic relations and development. In response to the various challenges arising from scientific, technological, and economic progress, the international community has adopted a number of globally recognized documents aimed at solving these problems and preventing them. Among these are the **"Convention on Climate Change,"** the **"Kyoto Protocol,"** and the **"Rio Declaration".**
These documents envisage the implementation of organizational measures aimed at reducing the negative factors causing climate change, preventing technological environmental pollution, preventing the disruption of natural balance through the rational use of natural resources, and protecting public health.

Concept of the environmental friendliness of automobile transport. The harmful effect of automobile transport on workers and the environment: when any fuel is burned, various combustion products are released. These wastes have a great impact on human health and the environment. Factories, plants, and motor transport enterprises in the city are the main sources of environmental pollution. While factories and plants are located in a specific place and pollute that area, automobiles affect wherever they operate.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

Automobile transport is currently considered a greater polluter of the environment than factories and plants. The biggest problem at present is reducing the toxic emissions from the use of automobiles. It has been determined that there are more than 200 toxic substances in the gas produced by the combustion of fuel, which is the main harmful emission from automobiles. The most toxic of these include: carbon monoxide - CO, unburned hydrocarbons - CH, and nitrogen oxides -NO. Permissible limits for these emissions have been introduced by many countries. In our country, the regulation of emissions from fuel combustion was introduced in 1970 based on the guidelines issued by the United Nations Economic Commission for Europe (UNECE).

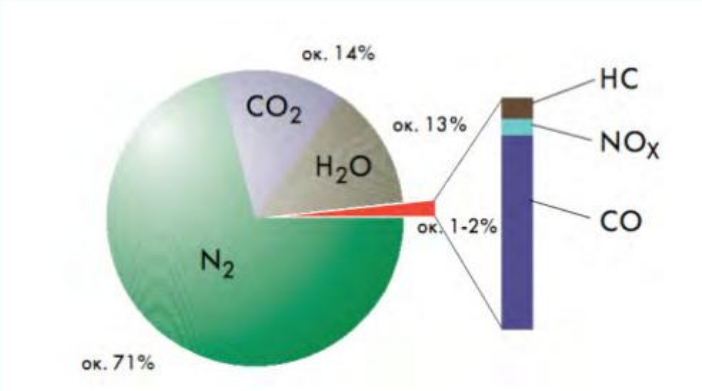

Figure 1. Composition of exhaust gases from gasoline engines

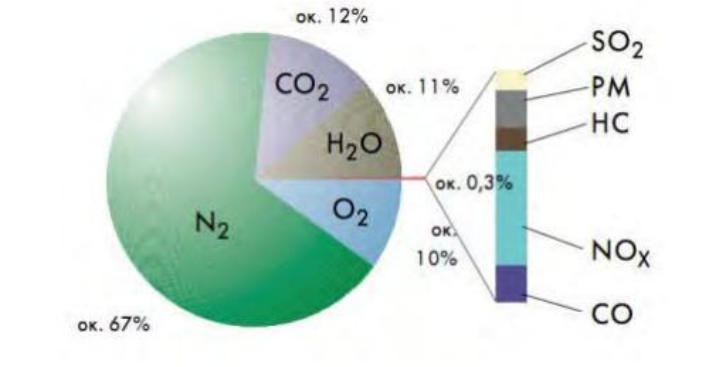

Figure 2. Composition of exhaust gases from diesel engines

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

As can be seen from the table and figure, the composition of the exhaust gases of the engine types under consideration differs significantly, primarily in the concentration of incomplete combustion products such as carbon monoxide, hydrocarbons, nitrogen oxides, and soot.

The toxic components of exhaust gases include:

- Carbon monoxide
- Hydrocarbons
- Nitrogen oxides
- Sulfur oxides
- Aldehydes
- Benzo(a)pyrene
- Lead compounds

Composition of harmful substances formed during transportation. The ecological problems of automobile transport are very relevant and related to the operating characteristics of modern models. If we take average figures, then one car consumes about 4 tons of oxygen per year, which is necessary to initiate fuel combustion processes. As a result of the operation of a car engine, exhaust gases consisting of many harmful components are formed. Thus, approximately 800 kg of carbon monoxide, 180-200 kg of carbon, and about 35-40 kg of nitrogen oxides are released annually. Carcinogenic compounds are also released into the atmosphere: nearly five thousand tons of lead, nearly one and a half tons of benzopyrene, more than 27 tons of benzene, and more than 17 thousand tons of formaldehyde. The total amount of all harmful and hazardous substances emitted during the operation of automobile transport is about 20 million tons, and these figures are very large and alarming.

In general, the composition of exhaust gases emitted by automobile transport includes more than 200 different components and compounds, and a large part of them have toxic properties. Some substances are formed as a result of the operation of vehicles and their interaction with surrounding surfaces, for example, due to the friction of rubber on asphalt.

The harm of various automobile parts that are not utilized properly cannot be ignored. As a result, landfills are spontaneously formed with millions of automobile

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

parts made of rubber and metal, which also release hazardous vapors into the atmosphere.

The operation of an automobile engine is a very complex process and involves many different reactions. Many substances are formed in this process, the main ones being:

Hydrocarbons - compounds made up of primary or broken-down fuel elements.

Soot - solid carbon formed as a result of pyrolysis and the main component of insoluble particles emitted by a car engine.

Sulfur oxides - formed in the process of sulfur, which is a part of automobile fuel.

Carbon monoxide - an odorless and colorless gas with low density and rapidly spreads through the atmosphere.

Hydrocarbon compounds - they are very poorly studied, but scientists have already managed to determine that these components of exhaust gases serve as a starting material for the formation of substances called photooxidants.

Nitrogen oxide - a colorless gas, the dioxide of which acquires a brownish color and a characteristic unpleasant odor.

Sulfur dioxide - is a colorless gas with a very pungent odor.

To reduce the toxicity of exhaust gases, work is being carried out in 2 directions:

I. Improving the engine operating mode, using various auxiliary equipment and high-quality fuel, and performing adjustment work.

II. Producing less harmful engines: gas turbine, external combustion - Stirling engine, electric vehicles, and so on.

According to data from the World Health Organization, the environmental pollution caused by the operation of automobile transport is characterized by the following indicators: for example, in the USA, out of 142 million tons of harmful substances released into the atmosphere annually, 86 million tons are generated by the operation of automobiles.

In an automobile, 3 different sources of environmental pollution can be observed: exhaust gases, crankcase gases, and harmful substances formed as a result of fuel evaporation (from the fuel tank, carburetor, etc.).

GOST 16533-70, which was introduced on January 1, 1971, limits the volume of CO in the exhaust gases resulting from the operation of gasoline engines.

GOST 21393-75 limits the smoke from diesel engine gases, and in 1980, the new state standard 17.2.2.03-77 was introduced to replace GOST 16533-70, which also

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

limits the volume of CO in the exhaust gases of gasoline engines. This standard applies to gasoline-powered trucks, passenger cars, and buses.

According to the new GOST, the volume of CO should not exceed 1.5% for all vehicles, and the inspection of CO in exhaust gases is carried out by traffic police officers during the 2nd technical inspection (2-TXK) in cities with a population of more than 300,000, as well as in capital cities, resorts, after vehicle repairs, and during technical inspections.

All motor transport enterprises should establish posts for determining the composition of exhaust gases. Service centers for technical maintenance should issue a certificate to private car owners. This certificate must state that the exhaust gases do not exceed the norms.

In addition to the toxic gases emitted by automobiles during operation, the noise they produce also affects the human body. The table below shows the most common noise levels

Table-2

Different noise levels

Sound source	Loudness, dB
Airplane engine, 5 m away	116
Factory noises	200-100
Orchestra, in the subway	80
Typing organization (typing bureau)	60-80
Noisy streets	60-90 and high
Clock operation, at a distance of 50 cm	30
The rustle of leaves	10

As the noise level increases, the duration of time people can work decreases sharply. If the noise level is 90 dB, a person can work for 8 hours. For every 5 dB increase in noise, the time a person can work is reduced by half. At 115 dB, a person can only be exposed to the noise for 15 minutes.

If the noise reaches 140 dB, it becomes dangerous for a person, causing pain in the ear, potential injury, and work is prohibited.

As a result of automobile noise, the driver's ability to work decreases, reaction time increases, and road traffic accidents may occur.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

Loud noise has a negative effect on the human body: it causes headaches and dizziness, dilates the pupils, increases the heart rate, disrupts the nervous system, and so on.

Studies show that at 88 dB noise (in the cabin of a LiAZ-677 bus), a driver's cognitive ability decreases by 10%, and at 95 dB, it drops by 20%.

The main sources of noise in automobiles are the engine and the muffler, with the next source being the tires. As the load on the tires increases, the noise also becomes louder.

Reducing the noise emitted by automobiles mainly involves improving their engines. The United Nations Economic Commission for Europe (UNECE) suggests the production and operation of vehicles with noise levels below 82-92 dB.

For example, in the United Kingdom, the use of freight vehicles with noise levels between 85-92 dB is not permitted. This restriction applies specifically to vehicles with a load capacity of 12 tons at the higher end of the scale.

In Japan, since 1971, a noise limit of 80 dB has been implemented for freight vehicles and 70 dB for passenger vehicles. In the United States, the noise limit for freight vehicles is set at 86 dB.

Automobile manufacturing plants have recently started addressing these issues by improving the combustion process in engines and installing 2-3 stage mufflers in the exhaust system. Currently, to prevent harm to the driver's work capacity, many buses have begun to install engines at the rear. In this setup, the driver is exposed to 8-10 dB less noise.

It is well known that in cities, automobile traffic is the main source of noise. Therefore, current construction of buildings and road division work must also be carried out in accordance with state standards.

Thus, rationally positioning the engine in the vehicle, covering the engine compartment with noise-absorbing materials, and improving the automobile aggregates and systems are ways to reduce noise.

Reducing exhaust emissions is achieved using special additives and neutralizers. Currently, the following devices are used to measure exhaust levels: UFMD-1P and SIDA-107 MDX in Russia, MK-3 in the UK, and DRM-2 produced in Hungary.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

Improving engines and using gas fuels instead of gasoline reduces air pollution caused by exhaust gases. Efforts are being made to improve vehicle maintenance and develop effective methods for neutralizing exhaust gases.

As living organisms adapt to the environment, they create favorable conditions for themselves, i.e., they alter their surroundings. For example, humans, driven by their needs, built industrial enterprises and factories and opened various types of mines. The toxic smoke emitted from these activities has had a negative impact on the environment.

Conclusion

In order to prevent ecological risks or ecological degradation caused by automobile transport systems, it is necessary to develop a scientifically-based ecological standardization system. This system should regulate the harmful environmental impacts of the automobile transport system, set requirements for sources of ecological risks, and ensure that these do not exceed specified threshold limits.

To reduce the harmful environmental impact of the automobile transport system, it is essential to create mathematical models of the material and energy exchange processes between the automobile transport system and the environment, and find solutions that satisfy the relevant conditions.

REFERENCES

1. Mirziyoyev SH.M. “Buyuk kelajagimizni mard va oliyjanob xalqimiz bilan birga quramiz” Toshkent. O‘zbekiston 2017 yil
2. O‘zbekiston Respublikasining birinchi Prezidenti I.A Karimovning 2015 yil 6-martdagi 2015-2019 yillarda muhandislik–kommunikatsiya va yo‘l transport infratuzilmasini rivojlantirish va modernizatsiya dasturi to‘g‘isidagi qonun.
3. Аксенов И.Я., Аксенов В.И. Транспорт и охрана окружающей среды. - М.: Транспорт, 1986. - 176 с.
4. Стадницкий, Георгий Вадимович. Экология. Учебник для вузов. Изд-ние 6-е.-СПб. Химиздат,2001.-288с.
5. Базаров Б.И. Газобаллонные транспортные средства и стационарные установки. Учебное пособие. − Ташкент: ТАДИ, 2005. – 204 с.
6. E.Fayzullayev va boshqalar. Transport vositalari tuzilishi va nazariyasi. Yangi asr avlodi 2006-yil

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 05, May, 2025
brightmindpublishing.com
ISSN (E): 3061-6972

7. Базаров Б.И. Экологическая безопасность автотранспортных средств. Учебное пособие. –Ташкент: ТАДИ, 2005.- 104 с
8. Базаров Б.И. Экологическая безопасность автотранспортных средств. Учебник.–Ташкент: Chinor ENK , 2012.-216 с.
9. Базаров Б.И., Калауов С.А., Васидов А.Х. Альтернативные моторные топлива. Монография. – Ташкент: SHAM SASA, 2014. – 189 с.
10. Базаров Б.И., Калауов С.А. Эксплуатация и испытания двигателей внутреннего сгорания. Учебное пособие. – Ташкент: Voris – Nashriyot, 2014. – 272с.