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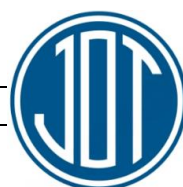
The “Journal of Transport” publishes the most significant results of scientific and applied research carried out in universities of transport profile, as well as other higher educational institutions, research institutes, and centers of the Republic of Uzbekistan and foreign countries.

The journal is published 4 times a year and contains publications in the following main areas:

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The share of transport vehicles in changing the atmospheric composition

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Abstract: This article describes one of today's global problems, the share of vehicles in atmospheric air pollution. The scientific and practical results of evaluating the environmental characteristics of the car are given through the methods of testing and calculation. The growth dynamics of vehicles over the years, traffic congestion and the amount of harmful gases emitted at the intersection are shown by the test. The quality of the object of research was a passenger car with gasoline ICE, and the exhaust gases (CO, CH, NOx and CO₂) were measured in the mode of engine operation. Through this test, the OBD is to analyze to what extent the car is environmentally friendly, the role and importance of the equipment used in the construction of the car, the share of light vehicles in the damage to the atmosphere. The results of conducted scientific research serve as a basis for achieving our main goal.

Keywords: exhaust gas graph, SCANMATIC device, INFRAKAR gas analyzer, number of cars

Atmosfera tarkibini o'zgarishida transport vositalarining ulushi

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Annotatsiya: Ushbu maqolada bugungi kundagi global muammolardan biri atmosfera xavosini zararlantirishda transport vositalarining ulushi xaqida yoritilgan. Sinov va xisob uslublari orqali avtomobilning ekologik xususiyatini baxolovchi ilmiy va amaliy natijalar berilgan. Transport vositalarining yillar kesimida o'sish dinamikasi, tirbandlik va choraxada chiqayotgan zararli gazlarning miqdori sinov orqali ko'rsatilgan. Tadqiqot ob'ekti sifati benzinli IYD yengil avtomobil olingan bo'lib, dvigatel salt ishlash rejimidagi chiqindi gazlari(CO, CH, NOx va CO₂) o'lchangan. Bu sinov orqali EBB avtomobilni ekologik bezararlik xususiyati qay darajada ushlab turishini, avtomobil konstruksiyasida qo'llanilgan jixozlarni ro'li va axamiyati, atmosfera tarkibining zararlantirishida yengil transport vositalari ulushini taxlil qilishdan iborat. Olib borilgan ilmiy tadqiqotlarning natijalari asosiy ko'zlangan maqsadimizga erishish uchun asos sifatida xizmat qiladi.

Kalit so'zlar: chiqindi gazlar grafigi, SCANMATIC qurilmasi, INFRAKAR gazanalizator, avtomobillar soni

1. Kirish

Xar bir davlat kabi yurtimizda xam atmosfera xavosini sifati va tarkibini yaxshilash, monitoring qilish bo'yicha keng qamrovli islohotlar olib borilmoqda. Amaliyotga joriy qilingan bir qancha tadbirlar va natijalarni ko'rishimiz mumkin. Xususan, Prezidentimiz tomonidan (PQ-171 31.05.2023, PF-5024 21.04.2017, PF-5863 30.10.2019, PQ-76 30.12.2021) tasdiqlangan qaror va farmoishlar amalda o'z tasdiqini topgan.

Tadqiqot dolzarbligiga kelsak, transport vositalaridan chiqayotgan zararli gazlarni miqdori pasaytirish, ekologik bezararlik ko'rsatkichlarini oshirish bo'yicha ilmiy tadqiqotlar bugungi kunga qadar davom etib kelmoqda. Yurtimizda transport vositalaridan foydalanish darajasi axoli o'rtasida kundan kunga oshib bormoqda. Ayniqsa yengil avtomobillar bo'yicha talab yuqori xisoblanadi. Chiqindi gazlar asosan tirbandliklar bo'lgan joylarda, chorxalalarda

ko'p xosil qilinadi. Ishlab chiqaruvchi korxona tomonidan xar bir avtomobil uchun belgilangan masofa orqali (80 – 100 ming km) uning ekologik bezararlik ko'rsatkichi xalqaro va milliy standartlarga javob beradi. Ammo ekspluatatsiyada muddatidan o'tgan yengil avtomobillardan foydalanib kelinmoqda. Ayrim avtomobillar masalan, damas, matiz va boshqalarda katalitik neytralizator, chiqindi gazlar aylanmasi (EGR sistemasi) ko'llanilmagan. Bu esa gazlar miqdorini oshishiga olib keladi.

Tadqiqot maqsadimiz esa foydalanishda bo'lgan, benzin yonilg'isida xarakatlanadigan yengil avtomobillardan chiqayotgan zararli gazlar miqdorini taxlil qilishdan iborat. Avtomobilning tirbandlikdagi xolatida xamda chorxadagi salt ishlash rejimida sinov ishlari amalga oshirilgan.

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2. Adabiyotlar tahlili

Faoliyatimiz davomida, yurtimizda va boshqa rivojlangan mamlakatlardagi ko'plab soxa mutaxassislarining ilmiy tadqiqot ishlari o'rganilib chiqildi.

B.I. Bazarov tomonidan zararli moddalarning massasi xisob uslubi berilgan bo'lib, asosan ma'lum bir rusumdagi

transport vositasining atmosferasiga chiqayotgan kunlik yoki yillik massasini formula orqali aniqlagan[1].

Zararli gazlarni kamaytirish bo'yicha meyoriy xalqaro standartlar ishlab chiqilgan [8]. Avtomobilning ekologik klassiga javob berish, xar bir transport vositasi uchun qat'iy amal qiladigan meyorga aylanib qolgan. Bu standartga yurtimiz xam a'zo bo'lgan.

1-jadval

Avtomobil ishlab chiqarilgan yili va mamlakat bo'yicha ekologik sinfi

Avtomobil ishlab chiqaradigan mamlakat	Avtomobil ishlab chiqarilgan yillar			
	Ekologik sinflar uchun texnik reglamentlarning tegishli talablari			
	EVRO 2	EVRO 3	EVRO 4	EVRO 5
YI mamlakatlari, benzin	1997 – 2000	2001 – 2004	2005 yildan	01.10.2009 yildan
YI mamlakatlari, dizel	1997 – 2001	2002 – 2004	2005 yildan	01.10.2009 yildan
AQSh	1996 – 2000	2001 – 2003	2004 yildan	-
Yaponiya	1998 – 2004	2005 – 2010	2011 yildan	-
Xitoy	2004 – 2007	2008 yildan	2011 yildan	-
Koreya	2001 – 2002	2003 – 2005	2006 yildan	-
Ukraina, M kategoriyali	2006 yildan	2010 yildan	2014 yildan	-
Ukraina, N kategoriyali	2007 yildan	2010 yildan	2014 yildan	-
Belarussiya	2006 – 2007	2008 yildan	2014 yildan	-
O'zbekiston	2007 – 2009	2010 yildan	2012 yildan	-
Qozog'iston	2006 – 2011	2012 yildan	2014 yildan	-
Rossiya	2006 – 2007	2008 yildan	2013 yildan	2014 yildan
Turkiya	-	-	2009 yildan	-
Eron	2009 yildan	-	-	-

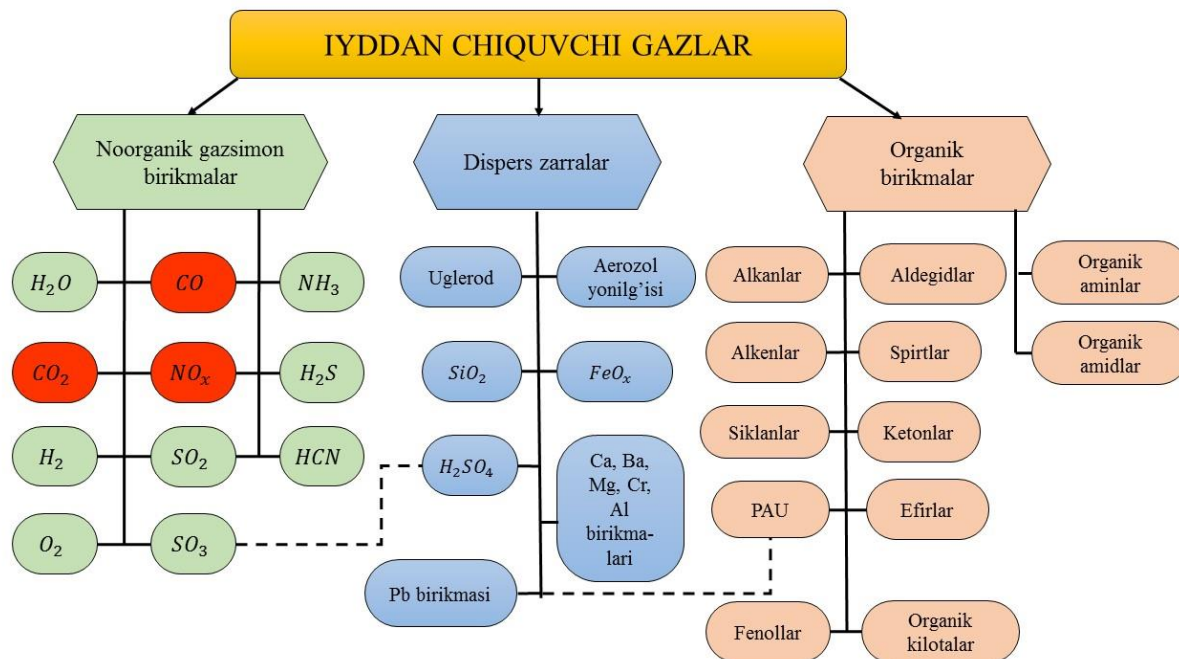
Avtomobil chiqindi gazlarini kamaytirishga oid soxa mutaxassislarining ko'plab ilmiy tadqiqot faoliyatlari amaliyotga joriy qilingan va o'z natijalarini bermoqda. Yurtimizda xam shu soxadagi olimlarimizning ko'plab tadqiqotlarini misol keltira olamiz.

Tao Qiu, Yakun Zhao va boshqalar. Mualliflar E20 va boshqa yonilg'ilardan foydalangan xolda IYD li va elektr gipridli avtomobillarning chiqindi gazlari tadqiqot qilingan. Xarakat sikli (WLTC) dan foydalangan, ikki xil transport

vositalarining chiqindi gazlari taqqoslangan[2, 3]. Bu usuldan ko'plab mutaxassislar foydalanib kelmoqda.

Xarakat sikli uslubi va bu orqali chiqindi gazlarni baxolash, chorroxadagi tirbandlikning ta'siri, OBD orqali tadqiq qilish xozirgi kundagi dolzarb uslublardan biridir[4, 5, 6].

Ichki yonuv dvigatellaridan quyidagi 3 guruxga bo'lingan gazlar chiqadi[7]. Biz 1 guruxga mansub bo'lgan 3 ta gazlar xamda chala yongan yonilg'ilarni o'Ichadik(1-rasm).



1 – rasm. IYoDning chiqindi gazlari tarkibi

3. Tadqiqot metodologiyasi

Tajriba – sinov ishlari quyidagi ketma-ketlikda salt ishlash rejimida amalga oshirildi. Dvigatelning sovitish suyuqligi harorati 85-90°C ga keltiriladi, INFRAKAR gazanalizator sensorlari dvigatelga sozlanadi va avtomobil

akkumulator elektr tarmog'iga, gazanalizator elektr tarmog'i ulanib (12V va 220V ishlashga mo'ljallangan) ishga tushiriladi. Qurilmaning o'lchash aniqligi va o'lchashdagi xatoliklari 2-jadvalda keltirilgan.

2-jadval

Qurilmaning o'lchash aniqligi va o'lchashdagi xatoliklari

№	O'lchov parametrlari Parameters of measurement	«Infrakar M2» -qurilma I aniqlik sinfi «Infrakar M2» - device I accuracy class	O'lchashdagi xatoligi, % Measurement error
1.	CO	0 – 10 %	±5
2.	CH	0 – 5000 ppm	±5
3.	CO ₂	0 – 25 %	±5
4.	NO _x	0 – 2000 ppm	±5
5.	n	0 – 10000 ayl/min 0 – 10000 rpm	±2.5
6.	λ	0 – 2	-

2-jadvaldagi o'lchov parametrlarining izoxi: **CO** – uglerod oksidi; **CH** – uglevodorod; **CO₂** – uglerod (II) oksidi; **NO_x** – azot oksidi; **n** – dvigatel tirsakli valining aylanishlar soni; **λ** – xavoning ortiqchalik koeffitsienti.

SCANMATIC qurilmasi ham OBD-II razyomiga ulanib, kompyuterdan SCANMATIC ilovasiga start beriladi va sinovchi uchun kerak bo'lgan parametrlar olinadi. Barcha kerakli sinov uskunaari sinov ob'ektiga sozlangandan so'ng, Dvigatel tirsakli valining burchak tezligi (ω_e) minimumdan maksimumgacha 500 rad/s interval oraliq'ida (750÷3000) sinov ishlari amalga oshiriladi. ω_e ni haydovchi gaz pedalini bosish orqali boshqaradi, ω_e xar bir qiymati uchun 30 sekundan keyin chiqindi gazlar tarkibi gazanalizator orqali

o'lchanadi. Har bir sinov oldidan gazoanalizator chiqindi gazni qabul qiluvchi zondi, atmosfera havosida tutgan xolda gazanalizator parametrlari 0 holatga keltirilishi va mashinaning ovoz sundiruvchi (glushitel) ichkarisiga 300 mm dan kam bo'lmagan masofaga sozlanishi kerak.

Yuqorida aytganimizdek, avtomobilning tirbandlikdagi xamda chorroxada salt ishlash rejimini inobatga olgan xolda dvigatelning 750 ayl/min dagi chiqindi gazlarini o'lchadik.

Tajriba uchun yengil avtomobil *Cobalt LTZ* olindi. Avtomobilning asosiy parametrlari 3-jadvalda berilgan. Dvigatelga ortiqcha yuklamasiz xolda salt ishlash rejimida ushlab turildi.

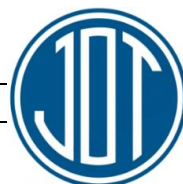
3-jadval

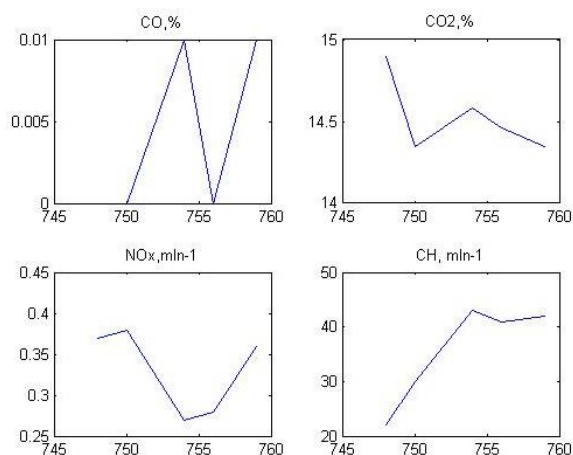
Avtomobilning asosiy parametrlari

№	Ko'rsatkichlar Indicators	Nomlanishi/Qiymati Name/Value
1	Avtomobil ishlab chiqarilgan yili Year of manufacture of the car	2022
2	Dvigatel turi Type of engine	Benzinli Gasoline
3	Benzin markasi Gasoline brand	A – 92
4	Dvigatel litraji, sm ³ Engine liter, sm ³	1485
5	Quvvat, kVt (l. s.) Power, kW (hp)	78(106)
6	Moment, Nm Torque, Nm	141
7	Uzatmalar qutisi turi Type of gearbox	AUQ Automatic Gearbox
8	EVRO standart EURO standard	EVRO – 4 EURO – 4

4. Taxlil va natijalar

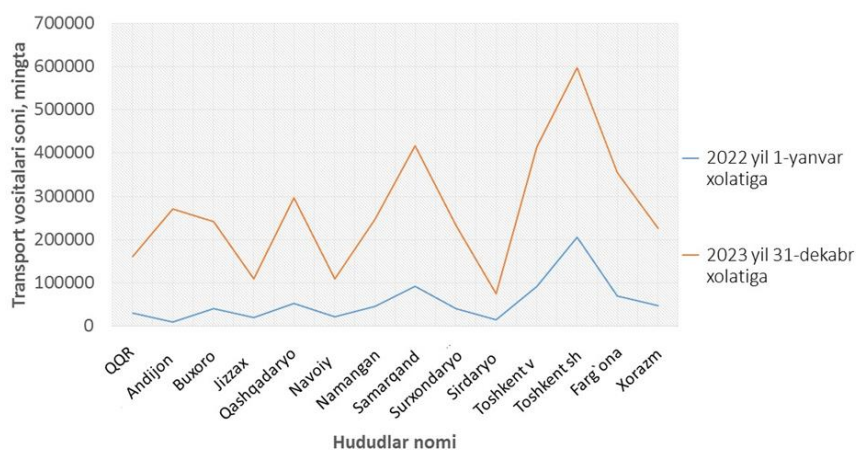
O'tkazilgan tajriba natijalarini grafik ko'rinishida ishlab chiqdik. MatLab R2014a programmasidan foydalangan xolda 2-rasm xolatida ishlab chiqdik. Dvigatel salt ishlash rejimida o'lchangan.





2-rasm. Chiqindi gazlarni dvigatel tirsakli valining aylanishlar soni bilan bog'liqligi

Yurtimizda mavjud transport vositalarining soni to'g'risidagi ma'lumotlar xam olindi(4-jadval) va grafigi ishlab chiqildi (3-rasm).



3-rasm. Jismo niy shaxslarga tegishli benzinda xarakatlanadigan avtotransport vositalarining soni

2022 yilda mavjud yengil va yuk avtotransport vositalarining benzin yonilg'i turi bo'yicha ma'lumot xam olindi(5-jadval).

5-jadval
2022 yilda mavjud yengil va yuk avtotransport vositalarining benzin yonilg'i turlari

T/r	Hududlar	Transport turi	Soni
1	QQR	Yengil	36760
		Yuk	2167
2	Andijon	Yengil	42550
		Yuk	2726
3	Buxoro	Yengil	79336
		Yuk	1815
4	Jizzax	Yengil	15770
		Yuk	349
5	Qashqadaryo	Yengil	101253
		Yuk	2370
6	Navoiy	Yengil	34221
		Yuk	1963
7	Namangan	Yengil	41560
		Yuk	4108

4-jadval
Yurtimizda mavjud transport vositalarining soni to'g'risidagi ma'lumotlar

T/r	Xududlar	2022 yil 1-yanvar xolatiga	2023 yil 31-dekabr xolatiga
1	QQR	30749	161926
2	Andijon	10303	271885
3	Buxoro	41566	241855
4	Jizzax	20066	109657
5	Qashqadaryo	52362	297305
6	Navoiy	22377	109274
7	Namangan	46968	247032
8	Samarkand	93106	417165
9	Surxondaryo	41210	233675
10	Sirdaryo	14984	75116
11	Toshkent v.	92802	414645
12	Toshkent sh.	206741	597931
13	Farg'ona	70690	354858
14	Xorazm	48392	226721
Jami		792316	3759045

8	Samarqand	Yengil	113553
		Yuk	2505
9	Surxondaryo	Yengil	63575
		Yuk	1538
10	Sirdaryo	Yengil	10004
		Yuk	1411
11	Toshkent v.	Yengil	173042
		Yuk	7871
12	Toshkent sh.	Yengil	449615
		Yuk	12016
13	Farg'ona	Yengil	58979
		Yuk	4276
14	Xorazm	Yengil	58896
		Yuk	1191
Jami		Yengil	1279114
		Yuk	46306



5. Xulosa va takliflar

Transport vositalarining sonini o'sish dinamikasi 3-rasmda aks etilgan bo'lib, bunda fakat bir yillik 2022-2023 yillar oralig'i olingan. Axoli orasida transport vositasidan foydalanish darajasi yildan yilga oshib bormoqda. Bu esa o'z navbatida chiqindi gazlarni miqdorini sun'iy oshishiga sabab bo'ladi.

Bizning maqsadamiz ichki yonuv dvigatelli avtomobillarni sonini kamaytirish emas, zararli gazlarni miqdori kamaytirish xamda avtotransportdan samarali foydalanishdir.

Biz 2022 yilda ishlab chiqarilgan yengil avtomobil ustida tadqiqot o'tkazdik. Albatta bu avtomobilning ekologik bezararlik ko'rsatkichlari yuqori, lekin bu tajriba orqali sinov o'tkazish uslubini ishlab chiqdik. Bu orqali keyingi barcha rusumli yengil avtomobillarda ko'llash xamda chiqindi gazlar miqdorini taqqoslash kabi ishlarni amalga oshirish.

Zararli gazlarni kamaytirish bo'yicha qo'yidagicha taklif beramiz. Sifatli yonilg'idan foydalanish, dvigatelning ekologik parametrlarini takomillashtirish, zararli gazlarni kamaytiruvchi katalitik-neytralizatoridan foydalanish, ekspluatatsiyadagi avtotransport vositalarini ekologik ko'rsatkichlarini oshirishdir.

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