

EXTENDED ABSTRACT

Investigation and Evaluation of Pollutants from Passenger Cars in Iran

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1. Introduction

Passenger cars are considered as one of the main sources of air pollution, especially in cities. The large pollutants that are generated from the combustion zone in vehicles, directly and indirectly, can affect the individual and national economy. In the direct economic losses, the gradual death of green spaces and forests can be opposition to the exposure of pollutants such as nitrogen oxides and ozone, or damage to monuments, objects, and facades of buildings due to corrosion by suspended particulate or matter pollutant compounds. To develop respiratory, heart, and lung diseases caused by various phenomena of air pollution in public health (Mayer et al., 1999; Jacob et al., 2016). By examining the results from technical examinations and comparing them with the standard of emission in Iran and European countries, it was found that all of the cars reviewed in this paper were consistent with Iranian emission standards, while in comparison to the Euro emission standards, they did not have a favorable situation. Therefore, the estimation of vehicles emissions, especially the internal vehicles using data collected from technical observation centers, is very necessary and can be achieved by estimating the pollution rate in the planning, reducing the pollution of large cities, as well as the prevention of small towns. In fact, if the amount of pollution of vehicles used inside Iran is available, it can be driven by a series of changes in the intended vehicle due to the factors affecting its publication and defining different projects to improve air pollution, as well as the direction of management and control of emissions from vehicles. In recent years, research aimed to investigate the amount of pollutants output, which suggests that, unfortunately, manufacturing cars in terms of environmental standards produce many pollutants (Gulbute et al., 1395). Therefore, in order to determine the exact status of internally produced vehicles, additional research is necessary. The study examined technical examinations, notably technical examinations of passenger cars and the pollution inspection of the seven cars that are very common in Iran. This study is done in East Azerbaijan, and Khuzestan provinces, which are completely different from the climatic point of view, and the results obtained from the two oblasts have been compared.

2. Research method

2.1. Output information from technical examinations

The collection research data required for two different provinces of the country has been collected from different technical diagnosis centers of East Azerbaijan and Khuzestan provinces. Data from both provinces have been collected and studied in April of 2017. These data are obtained by technical examination sheets,

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which are provided by technical examination centers after finishing the tests for each vehicle. These include information such as car navigation, time of tests, recent car visits, Amount of CO, HC, CO₂, O₂, and λ related to the vehicle, the right functionality of the main parts of the vehicle, such as steering, brake, lights, windows, etc. (Negatbakhsh Isfahan, 1392).

2.2. Statistical Methods

Collected data from the center intended for 7 vehicles constructed in Iran, which are the most used in this country. In this part of the paper, the situation of contamination of Pride, Peugeot 405, Peugeot 206, Samand, L90, Peugeot Roa and Pekan are reviewed by information from the technical examination centers. Collected data for vehicles with average navigation means 150 thousand km, and the number of data for each vehicle is 59. Calculation of regarding the technical examinations by Excel software, as well as scoring for detection of the most contaminated vehicle for the emission of CO and HC by using the method of weighing the average parameters and verifying the results of calculations by the Newman-Kells test (Delaware, 1392).

3. Discussion and results

3.1. Presenting and analyzing the results of technical examinations in East Azerbaijan province

Regarding the result of the average amount of gases of CO, HC, CO₂, and the λ coefficient of the technical examination centers of East Azerbaijan Province, along with the standard deviation of each of the parameters, are shown in Table 1. In this paper, worthless data of the calculations are omitted to make calculations with acceptable results and accuracy. In fact, the standard deviation of the data indicates the accuracy of the calculations. According to the results Peugeot Roa, Pride and Peugeot 405 are the most polluted car in terms of CO emissions, as well as the Pride, Peugeot Roa and Pekan the most polluting cars in terms of HC emission.

Table 1. Results of technical examinations of East Azerbaijan Province.

Parameters	Pekan	Roa	Pride	Peugeot 405	Samand	Peugeot 206	L 90
Average of CO (percent of Volumetric)	0.457	0.490	0.465	0.461	0.411	0.302	0.156
Standard deviation of CO	0.099	0.046	0.075	0.093	0.059	0.110	0.067
Average of HC (PPM of Volumetric)	106.50	118.50	130.17	90.27	95.60	94.40	71.47
Standard deviation of HC	7.04	21.17	32.22	15.27	12.47	32.92	21.07
Average of λ	1.040	1.042	1.043	1.040	1.038	1.038	1.033
Standard deviation of λ	0.131	0.130	0.129	0.128	0.130	0.129	0.130
Average of CO ₂ (percent of Volumetric)	13.771	13.555	13.602	13.867	13.841	14.016	14.460
Standard deviation of CO ₂	1.570	1.920	2.160	1.661	1.760	2.120	1.650

3.2. Presenting and analyzing the results of technical examinations in Khuzestan province

Regarding the result of the average amount of gases (CO, HC, CO₂) and λ coefficient of the technical examination centers of Khuzestan province with the standard deviation of each parameter are shown in Table 2. The L90, Peugeot 405, Samand, Pekan, and Pride respectively have the highest CO₂ emissions, as well as λ coefficient of the L90, Samand, Peugeot 405, Pekan and Pride respectively the closest distance from the optimum λ value.

Table 2. Results of technical examinations of Khuzestan province.

Parameters	Pekan	Pride	Peugeot 405	Samand	L 90
Average of CO (percent of Volumetric)	0.629	0.636	0.614	0.561	0.170
Standard deviation of CO	0.150	0.130	0.150	0.130	0.050
Average of HC (PPM of Volumetric)	127.80	138.20	109.10	101.15	75.11
Standard deviation of HC	3.20	30.20	29.40	32.40	29.50
Average of λ	1.044	1.045	1.043	1.041	1.037
Standard deviation of λ	0.140	0.140	0.150	0.160	0.120
Average of CO ₂ (percent of Volumetric)	13.75	13.58	13.74	13.69	14.35
Standard deviation of CO ₂	2.850	2.970	2.710	3.120	2.300

4. Conclusions

The cars that work with Euro 2 Pollution Standard, such as Pride, Pekan and Peugeot Roa cars, show the most emissions, and in general, Pride is the most polluted car in terms of emissions of primary and cleaner vehicles in terms of carbon dioxide emissions in this paper. While e L90 with Euro 4 pollution standard is the cleanest vehicle in terms of producing the primary and most contaminated vehicles in terms of carbon dioxide emissions compared to other vehicles. Among all the vehicles surveyed in this paper, only L90 behavior was in accordance with the Euro 4 emissions standard, more than anything else in terms of CO emissions, except for L90, only Peugeot 206 was behaved so closely to the Euro 4 emissions standard, and in terms of HC emissions, Peugeot 206, Samand and Peugeot 405 that respectively, are Euro 4 optimally, behaved in accordance with the Euro 2 emission standard. Pride, Peugeot Roa, and Pekan also had a huge disparity with the Euro 2 and Euro 4 emissions standards. The obtained results are in good agreement with the standard range of 9181 (2010). In fact, all the cars have virtually emission standards. Euro 4 optimally vehicles have a higher amount of pollutant emissions rather than Euro 4 vehicles, and the proximity of the Peugeot 405 emissions to Euro 2 vehicles can prove it. The emissions of cars are changing as the climate changes, as well as the location of the site. L90 as a Euro 4 car, is less impressive compared to the Euro 2 vehicles influents than the environmental parameter. In fact, the more automotive technologies get older, the greater impact occurs. The number of primary pollutant emissions in the province of East Azerbaijan was lower than in Khuzestan province in April. Despite the equal level of technology in Pekan and Pride and high gasoline consumption in Pekan, the results indicate that Pekan has much less pollution in situ mode. Actually, this investigation only applies to the calculation of situ mode and this may be different for moving mode.

5. References

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