

EVALUATION OF SOME INDICATORS OF GASOLINE AND DIESEL PRODUCTS, IMPORTED IN THE REPUBLIC OF ALBANIA

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ABSTRACT: *The development of the transport sector after 2000 in the Republic of Albania is accompanied by growing consumer trends in fossil fuels, diesel and gasoline, which are mainly provided by imports. This trend is associated among other things with negative impacts on the environment, especially in urban areas due to emissions of CO₂, SO₂, VOx or heavy metals, such as Pb, etc., which are created as a result of fuel combustion in vehicles. The aim of this study is to assess the environmental parameters of the lead content and Octane Number in gasoline and the sulfur content in diesel, in order to recognize the situation of qualitative petroleum market in Republic of Albania, the comparison with the limits set in the Albanian Standards, influence of European Legislation on the quality of these imported products and the effects of laboratory control. Are studied the results of testing in Customs Laboratory for 230 gasoline samples and 333 diesel samples.*

KEYWORDS: gasoline, diesel, sulfur content, Octane Number, lead content, environment.

INTRODUCTION

After 1998, the market in the country is supplied to import gasoline, because the Oil Processing Industry is producing only Virgin Naphtha fuel type (petrol with low Octane Number). The same situation exists for diesel, whose market over the past decade is provided mainly by imports and only a small fraction (25 - 30%) has been originating country. Structure of vehicles in this period has been approximately in the ratio 6:1 in favor of diesel motor vehicles compared to gasoline vehicles. This explains the greater amount of diesel import during 2007-2011 which is approximately 2,144 million tons. In this period the amount of imported diesel compared with petrol has been in ratio of 5: 1. The greater quantity of fuels imports carried out from Greece, Italy and Romania. The largest volume of imports carried out at the Customs port of Durres, Lezha and Vlora.

In these conditions, evaluation of fuel qualitative indicators and particularly of lead content in gasoline and sulfur in diesel takes a special importance not only for the improvement of standards regarding quality, but also to reduce environmental impact. Studies of the World Health Organization (WHO) estimated that almost 800,000 people a year die prematurely because of air pollution in urban area and most of these deaths occur in developing countries.

Quality control of hydrocarbons is carried out not only by the Customs Laboratory but also by the Inspectorate State Head. According to Law No. 8450, dated 24.2.1999 "For the processing, transportation and marketing of oil, gas and their by-products", the State

Inspectorate Responsible has the right and is responsible for quality control of petroleum oil imported or produced domestically.

LITERATURE

The National Law No. 8450, dated 24.2.1999 'For the processing, transportation and marketing of oil, gas and their by-products', as amended, manages the processing, transportation and marketing of petroleum oils and their derivatives. The Albanian Legislation continuously has adopted the European Standards, regarding the quality of diesel and gasoline products.

Albanian Legislation related to imported gasoline

Until 31 December 2008 are implemented two Albanian Standards: STASH 69-95 for leaded gasoline (the lower limit of Octane Number is 92), and SSH EN 228: 2008 for unleaded gasoline (the lower limit of Octane Number is 95).

By Decision Nr.147, of date 03.21.2007 'On the quality of fuels, petrol and diesel', from 1 January 2009 onward, permitted only the marketing of unleaded petrol, in accordance with Standard SSH EN 228: 2008. Under this standard permitted level of lead content in gasoline is a maximum of 0.005 g/l and the minimum level for Octan Number is 95.

Albanian Legislation related to imported diesel

Regarding of sulfur content are implementing these levels specified in Albanian Standards:

Until 31 December 2008 are implemented the diesel standards that permitted sulfur content up to 2,000 ppm (S SH 31 :1997) and later are implemented the standards which apply limits specified in Decision 147, dated 21.03.2007 (reflected in EN 590: 2009):

- From 1 January 2009, the maximum of permitted S content must be 350 mg / kg;
- From 1 January 2011, the maximum of permitted S content must be 10 mg / kg.

European Legislation related to petroleum oils

EU directives are a very important factor that are taken into account during the drafting of European Standards of fuels. These standards define environmental and technicians parameters, and affected by the implementation of other directives related to petroleum oils. The following are main directives related to environmental and technical parameters for gasoline and diesel products.

Directive 85/210/EEC of 20.3.1985

Under this Directive, from 1 October 1989 the Member States shall take the necessary measures:

- to ensure the availability and balanced distribution of unleaded petrol in their territory;
- trading of gasoline with minimum of Octane and Motor Number respectively 85.0 and 95.0.

Under this Directive 'unleaded gasoline' means any gasoline containing $Pb \leq 0.013$ g/l, and 'leaded gasoline' means any gasoline containing $Pb \leq 0.40$ g/l and ≥ 0.15 g/l.

Council Directive 98/70/EC of 13 October 1998

Put limits to reduce the lead content in gasoline and sulfur content in diesel fuels, as follows:

- No later than 01/01/2000 Member States shall prohibit the marketing of leaded gasoline;
- No later than 01/01/2000 Member States must trade unleaded gasoline with maximum of lead content of 0.005 g/l;
- No later than 01/01/2000 the maximum of permitted S content in diesel must be 350 mg/kg (EN 590:1999);
- Not later than 01/01/2005 the maximum of permitted S content in diesel must be 50 mg/kg or 10 mg /kg;

The **Directive 2003/17/EC of 3 March 2003** has improved environmental parameters for the sulfur content of petrol and diesel. According to these directives reduction of sulfur content for diesel and petrol to max 10 mg/kg starts on 1 January 2005 in certain territories, and from 1 January 2009 did not allow trading within their territory of these products with S more than 10 mg/kg.

METHODOLOGY

The object of this study is related to the evaluation of the analytical results of gasoline and diesel products carried out in the Customs Laboratory and comparison of results with Albanian and European Standards. Drawing conclusions on the implementation of the Albanian Legislation and the impact of European Standards on the quality of these imported products.

Are studied the test results of 230 gasoline tested in period of time 2001 - 2010 and 333 diesel samples, tested in period of time 2007 – 2011. In Table 1 is given the distribution in the years.

Table 1: Number of samples tested during the period 2000-2011

Year	2001	2002	2003	2005	2006	2007	2008	2009	2010	2011	Total
Nr of gasoline samples	12	39	35	10	6	2	58	26	42		230
Nr of diesel samples						41	71	40	125	56	333

For testing of samples the Customs Laboratory has implemented the methods based on the Albanian Standards (S SH) which mostly are official version of international standards: EN, ISO, ASTM etc. In Table 2 are show the methods for testing of lead content and O.N. in gasoline and sulfur content in diesel.

Table 2 Parameters and methodology used in analysis

	Parameters	Methods
Gasoline	Content of lead, gr/l	ASTM D 3237
	Octane Number O.N.	ASTM D 2699
Diesel	Content of sulphur, %	EN ISO 20846

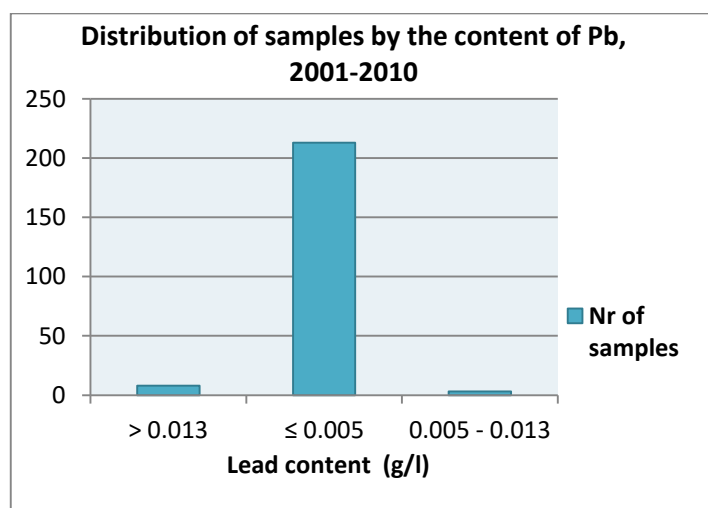
RESULTS

The lead content and Octane Number in imported gasoline

Results of the lead content in the tested samples are divided into 3 intervals shown in Table 3. For six tested samples didn't have the results of lead content.

Table 3 Distribution of samples by the content of Pb, 2001-2010

Lead content (g/l)	No of gasoline samples
> 0.013	8
≤ 0.005	213
0.005 - 0.013	3
Total	224

**Figure 1. Distribution of samples by the content of Pb, 2001-2010**

From the table of tests, noted:

1. The majority of the samples about 95% (213 samples) are in the range of ≤ 0.005 g Pb/l;
2. The smaller number of the samples about 1.34% (3 samples), are in the range of 0005 - 0013 g/l;
3. Result 8 samples (3:57%) containing Pb > 0.013 g/l.

1. The samples with lead content > 0.013 g/l

These samples belong the period of time 2001 - 2002. Table 4 present the distribution of these samples as well as indicators of the lead content and Octane Number. Octane number is tested only for 4 samples. Only one sample results with O.N. > 95.

Table 4 Distribution of samples with lead content > 0.013 g/l

Year	Lead content (g/l)	Interval of lead content (g/l)	O.N.
2001	0.11	> 0.013	
2001	0.032	> 0.013	89
2001	0.19	> 0.013	
2001	0.11	> 0.013	
2001	0.1	> 0.013	
2002	0.11	> 0.013	99
2002	0.046	> 0.013	93
2002	0.04	> 0.013	92

The samples with lead content 0.005 – 0.013 g/l

In table 5 are presented the distribution of samples and analytical indicators. The data show that N.O. is within the limits specified in the European and Albanian Standards (min 95).

Table 5 Distribution of samples with lead content 0005 - 0013 g/l

Year	Lead content (gr/l)	N.O.
2005	0.01	96
2007	0.013	95
2007	0.013	95

The samples with lead content < 0.005 g/l.

As seen in Table 2, the samples with lead content < 0.005 g/l are in the highest number of total. From 224 samples tested, 213 (95%) resulting with lead content of less than 0.005 g/l.

Distribution of samples according O.N. (Maximum of lead content is 0.005 g/l)

The Figures 2 and 3 show the distribution of samples by O.N. with maximum lead content of 0.005 g/l. From the data, the large number of samples results in the range of O.N. 95 – 98 (about 69%).

In the range of O.N. < 95 result 60 samples (28.98%) and the majority of them are tested in 2003.

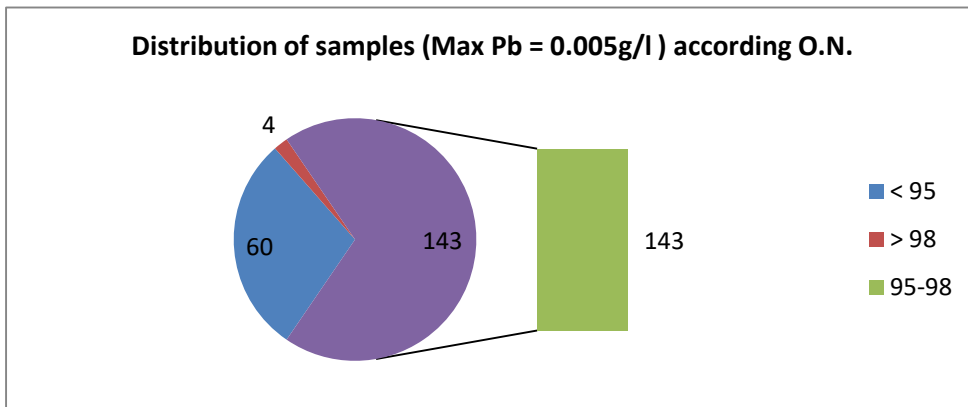


Figure 2. Distribution of samples according to O.N.

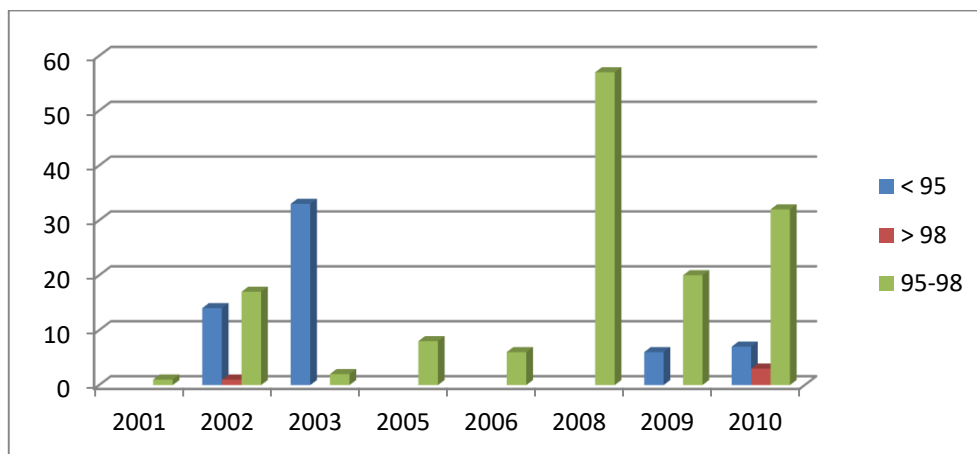


Figure 3. Distribution of samples according to O.N. in years

Sulfur content in diesel

The samples (333 samples) of diesel are tested in period of time 2007 - 2011. The limit values of sulfur content in Albanian Standards of diesel are:

S SH EN 590 : 2000, max of sulfur 350 mg/kg

S SH EN 590 : 2009, by period of time; max of sulfur 50 mg/kg and 10 mg/kg sulfur.

Taking into account the limit values of the two standards mentioned above, shows that about 26.43% of the samples have sulfur content greater than 0.035%. Approximately 20.72% of these are samples with sulfur content greater than 0.1%.

Well, this shows that the largest amount of sample results with high sulfur content. In total, the largest amount of samples, about 49.85%, result with sulphur content < 0.001%.

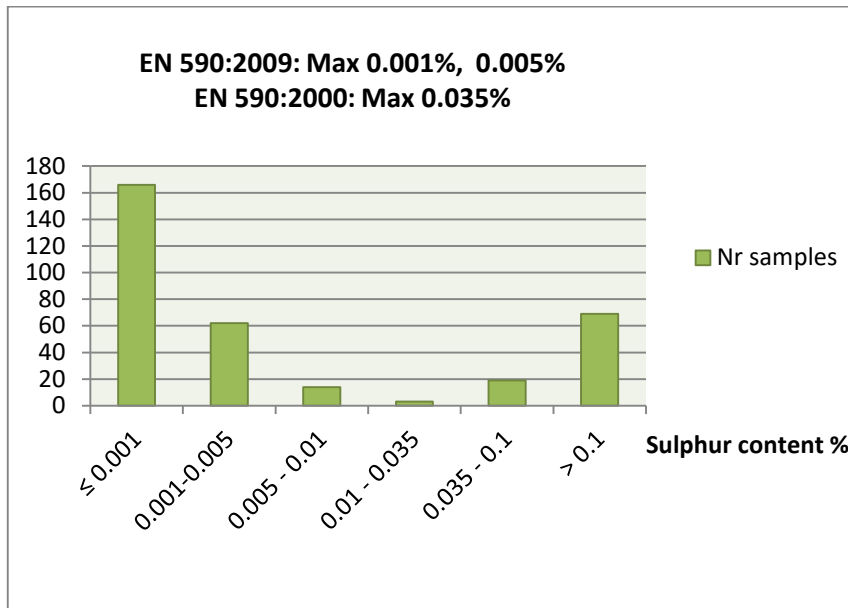


Figure 4 Distribution of the number of samples according to the sulfur content

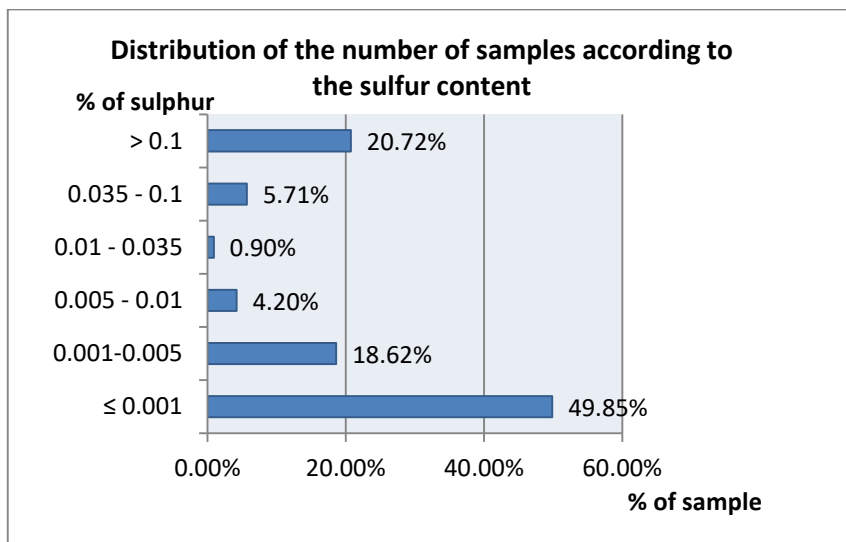


Figure 5. Distribution of samples (in%), according to the S content

Distribution of sampling in years according to the sulfur content intervals is presented in table 6. From data table we conclude that in 2009 resulting 7 samples out of standard (sulphur content > 350 mg/kg) whereas in 2011 resulting 11 samples (sulphur content > 10 mg/kg). The largest number of samples with high sulfur content results in the period of time 2007 - 2008 (74 samples).

Table 6. Distribution of sampling in years

Content of Sulphur (%)	2007	2008	2009	2010	2011
> 0.035	40	34	7		7
≤ 0.001			15	106	45
0.001-0.035	1	37	18	19	4
Total	41	71	40	125	56

CONCLUSIONS

About the results of the lead content in gasoline

During the period 2001 - 2010 result 11 samples (4.78% of total) with lead content > 0.005 g/l. The majority of samples belong to the year 2001 (around 45%). We note that the Standard EN 228 : 2008 was implemented in 2008. After this period does not result unleaded gasoline samples with lead content > 0.005 g/l. But also it must be said that for the entire period results do not seem problematic. This comes as a result of the fact that imports of this product are mainly from EU countries (Greece and Italy).

About the results of the Octane Number

From the data in total are 63 samples (29.57% of total) with O.N. < 95, 3 samples belong leaded gasoline and 60 belong unleaded gasoline. The largest number of samples belong the period 2002 - 2003 (53 samples), but otherwise from content of Pb, in this case there are samples that have O.N. < 95. These samples belong the period 2009 - 2010 (13 samples), when the limits set in Standard SSH EN 228 have been mandatory.

About the results of the sulfur content in diesel

Given the results of tests for the period 2001 - 2010 shows that imported gasoline are good in terms of the lead content and inconsistencies regarding O.N

Levels of sulfur content in diesel seem problematic. Although its content is reduced, in the period 2009 - 2011 has result a significant number of samples outside the standard.

DISCUSSIONS

From the tested of gasoline samples noted that the performance of lead content and N.O. level has gone towards enhancement of their values to the limits allowed by standards, over the years. This is a result of analytical control from Customs Laboratory and the improvement of European Legislation, as the data indicate that imports of this product they are mainly have been from European Countries. The problems especially in the sulfur content of diesel have come as a result of non-implementation of legislation and standards in force.

RECOMMENDATIONS

Updating on time of European Standards on hydrocarbons in order to improve the quality of imported products and preserve the environment from pollution and better performance of vehicles.

Conducting continuous laboratory controls on imported petroleum products and prosecute entities that do not implement the approved standards.

REFERENCES

Anonymous. General Directorate of Customs, Albania, Tirana. Private communication.

Anonymous. Customs Laboratory of Albania. Private communication.

Beqiraj I. et al. (2011): *Monitoring the quality of gasoline marketed in Albania during the last decade and the impact on the environment*, National Scientific Conference Chemistry and actual development of the country, Tirana.

Beqiraj I, et al. (2012): *Evolution on the diesel fuels national Standards during last decade and its environmental impact*", International Conferences of Shkodra "Towards future sustainable development".

Belshaku M (2016): 'Study of some quality parameters of diesel imported in Albania for the period 2008 – 2011', 6th International Conference of Ecosystems, Albania.

Opening the door to Cleaner Vehicles in Developing and Transition Countries: *The role of Lower Sulphur Fuels, Report of Sulphur Working Group of the partnership for Clean Fuels and Vehicles (PCFV) 2007*, (6). Available on line: <https://www.fiafoundation.org/media/44426/sulphur-report.pdf>

Council Directive 85/210/EEC of 20 March 1985 *on the approximation of the laws of the Member States concerning the lead content of petrol*.

Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 *relating to the quality of petrol and diesel fuels*.

Decision Nr.147, of date 03.21.2007 "*On the quality of fuels, petrol and diesel*".