

STUDIES REGARDING THE AIR POLLUTION WITH SULPHUR DIOXIDE IN TG-JIU MUNICIPALITY

Camelia Căpățină, *Constantin Brâncuși” University, Târgu-Jiu, ROMANIA*
Gheorghe Gămăneci, *“Constantin Brâncuși University, Târgu-Jiu ROMANIA*

ABSTRACT: The industry, the transports, the agriculture, the zootechny, the urban agglomerations are possible and current strong pollution sources, when their framing into the general ecological circuit is not well adapted. The man should understand better the unity between nature and all the intimate connections between its factors, and he should also insert objective phenomena to this complex of structures, as the addition of the human activities uses, but also respects a pre-existing rule. This paper presents studies regarding the air pollution with SO₂ in TG-JIU municipality. The monitoring of the sulphur dioxide concentrations in the environmental air was made by means of some automatic stations placed in each area. The air pollution caused by the car traffic may be improved by building enough parking spaces and by improving the public transport system.

KEY WORDS: monitoring, sulphur dioxide, air, environmental.

1. INTRODUCTION

Generally, the atmosphere pollution represents the consequence of certain human activities and it is a current phenomenon of the human life. Most of the polluters start from burnings which generate energy. The intern burning motors used in transports, the burnings of gas, liquid or solid fuels (coals, wood), in industrial units, when heating the lodgements etc. causes emissions of substances and particles released in the atmosphere, causing damaging concentrations. In combination with the tradition impurities in the air, the situation

is even more complicated. More than 100 polluting substances were spotlighted in the atmosphere, and the most frequent ones were the sulphurous anhydride, the carbon dioxide, the nitrogen oxides, the polycyclic hydrocarbons, the smoke, the sulphur. [3]

Globally, only a third of the sulphur penetrating the atmosphere is produced by the human activities; two thirds, as sulphur oxides or sulphured hydrogen, are produced by natural sources. [2]

A comparative presentation of the main sources of sulphur oxides pollution is illustrated in figure 1.

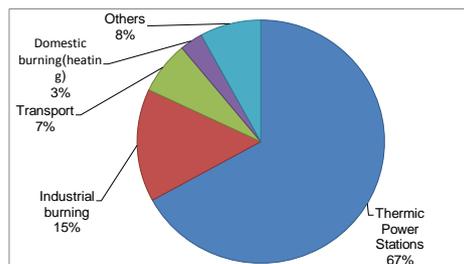


Fig. 1. The main sources of sulphur oxides pollution in the atmosphere.

Due to the different capacity of diffusion and also to the varied molecular weights, different polluting agents in the atmosphere will manifest a certain tendency of segregation. For example, the carbon oxide and the cyanhydric acid – having the density lower than the air – are quickly spreaded in the superior layers of the atmosphere while the volatile compounds of the slug or of other heavy elements remain in the inferior layers.

This segregation is accelerated by the absorption of certain polluting agents on the aerosols in the atmosphere. In this case, the segregation dynamics is not dictated by the physical features of the polluting agent, but by the mechanical ones of the aerosol [1]. This paper presents studies regarding the air pollution with SO₂ in TG-JIU MUNICIPALITY.

2.EXPERIMENTAL

The monitoring of the sulphur dioxide concentrations in the environmental air was made by means of some automatic stations placed in each area.

The automatic station for monitoring the air quality is built for being able to work continuously according to the following planning:

- The air is sampled by means of a well and the samples are introduced into each analyser by means of a distributor;

- The values measured by the analysers and by the entire equipment are purchased and stocked in the purchasing system installed in the station;
- These data are shown on the outside informing panel;
- Periodically, the accumulated data are transmitted to the system for collecting the distance data, which is supposed to supervise and control the monitoring network of the air quality.

The sulphur dioxide analyser is based on the principle of the classic spectroscopy of fluorescence. The sulphur dioxide presents a strong absorption spectrum in ultraviolet, between 200 and 240nm. The photon absorption at these wave lengths results into the fluorescent photon emission with wave length between 300 and 400nm. The emitted fluorescence quantity is directly proportional to the sulphur dioxide concentration.

The actual analyser is composed of a supplying module /microprocessor containing the energy source, the tension regulators and the system microprocessor and the sensor module containing all the components necessary for measuring the sulphur dioxide.

3.RESULTS AND DISCUSSIONS

The interpretation of the results regarding the sulphur dioxide concentrations in the air was made

according to the stipulations of Law no. 104/2011 [2] regarding the quality of the environmental air.

For the sulphur dioxide, the limit value admitted in the environmental air for the human health is $125\mu\text{g}/\text{m}^3$, as a daily average.

For monitoring the air quality in Tg. Jiu municipality, the automatic

station is placed in the north-west of the town.

In 2012, the total number of the calculated daily average concentrations was 343, and there was no overflow during the entire year. The results obtained in 2012 are presented in table no. 1.

Table no. 1 Daily average concentrations of de SO_2 in Tg. Jiu area in 2012 ($\mu\text{g}/\text{m}^3$).

Day	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
1	48.0	60.5	34.3	7.3	15.3	18.8	32.3	9.8	7.9	11.0	7.8	12.2
2	40.3	25.0	23.8	13.5	25.5	6.3	12.1	9.5	8.3	9.5	7.3	2.7
3	47.5	21.5	8.3	27.7	11.1	19.8	16.7	25.0	7.1	16.2	6.9	5.5
4	38.5	19.3	18.2	25.9	28.3	11.4	82.4	10.3	9.5	18.1	10.1	10.1
5	37.6	22.6	43.6	17.2	8.8	8.1	48.8	13.5	7.9	13.3	10.7	4.6
6	42.0	48.9	63.3	15.4	9.1	5.7	18.8	24.9	10.2	38.5	8.5	3.1
7	39.0	52.7	24.3	8.5	26.3	30.5	54.8	9.6	19.6	35.4	10.9	2.7
8	34.0	21.3	44.6	8.7	12.2	28.7	26.7	23.1	22.2	6.8	24.8	2.2
9	38.1	21.9	64.6	10.3	12.4	28.7	6.1	14.4	8.4	16.1	8.1	3.8
10	32.7	31.2	39.8	30.1	10.2	13.3	24.3	31.2	13.4	16.2	15.0	3.6
11	34.1	31.1	40.4	25.1	21.6	17.9	13.1	10.1	8.2	12.4	11.4	
12	34.9	29.5	17.9	34.2	13.3	25.2	13.5	12.3	9.6	15.1	18.9	
13	29.5	37.1	25.9	12.9	9.9	9.9	12.8	8.1	9.2	6.3	34.3	
14	24.2	40.5	15.9	11.8	5.5	10.2	10.5	8.1	15.0	5.4	8.9	
15	25.5	25.2	10.7	10.2	6.3	13.2	20.9	8.8	13.3	7.5	9.1	
16	27.6	25.2	52.6	15.3	6.2	25.0	3.0	17.1	10.3	9.4	7.8	
17	31.0	20.2	71.0	9.2	6.4	19.0	16.9	19.5	10.0	8.3	6.9	
18	44.1	25.8	24.9	7.1	6.5	9.4	13.5	11.1	9.2	9.3	6.9	
19	37.2	25.4	15.7	13.0	13.8	8.2	12.3	10.4	7.8	38.8	8.0	
20	39.1	30.0	12.9	22.2	22.0	17.8	49.6	14.8	7.1	9.6	7.4	
21	25.2	47.5	10.8	9.4	7.7	22.6	29.0	14.9	8.3	7.2	7.9	
22	32.5	63.8	23.9	11.2	7.9	25.1	14.0	23.8	15.6	11.5	10.9	
23	29.9	32.0	76.8	19.5	8.6	21.6	10.0	23.2	21.1	17.7	30.3	
24	29.1	30.6		21.9	7.8	7.5	10.8	26.3	36.7	12.0	24.4	
25	24.3	22.7		12.2	9.2	18.0	10.0	30.2	20.6	16.2	17.8	
26	35.2	15.7	11.9	10.5	6.4	8.7	8.3	44.3	15.2	12.7	21.5	
27	46.2	12.0	11.2	13.6	6.3	10.3	9.2	10.7	28.8	10.8	100.4	
28	46.4	14.1	12.2	9.5	8.2	47.4	16.1	7.8	21.6	7.4	40.3	
29	39.6	17.4	8.3	10.6	7.5	33.7	28.4	13.7	15.4	5.9	37.1	
30	35.9		7.9	11.3	7.9	22.5	13.4	12.2	21.4	5.7	23.1	
31	31.5		8.6		17.6		11.0	10.6		10.6		

In 2012, the period of time with the highest sulphur dioxide concentrations was in January, when the monthly average represented 28.4% of

the admitted limit value and it is presented in figure no. 2.

The average daily concentrations of this period of time contained values

representing between 19.4% and 38.4% of the admitted limit value.

Except for December, when the number of the measurements of the sulphur dioxide represented a third of the time, the lowest average daily concentrations were registered in May, when the monthly average of this period of time represented 9.9% of the admitted

limit value and it is presented in figure no. 3.

The highest average daily concentration of this period of time represented 22.6% of the admitted limit value, and the lowest one, 4.4% of it.

The other monthly averages in 2012 represented between 10.8% and 24% of the admitted limit value.

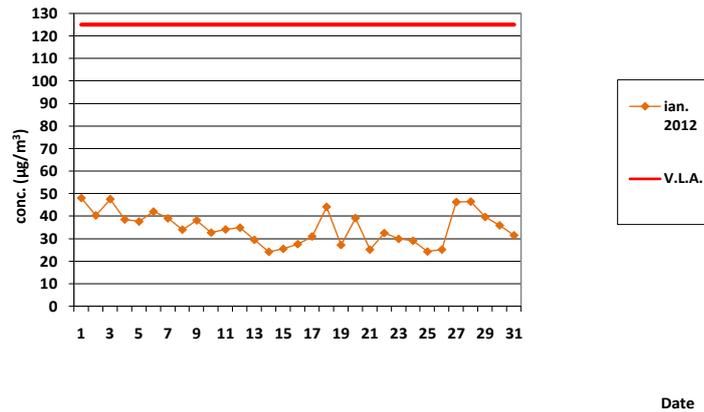


Fig. 2 Variation of SO₂ concentrations in January 2012.

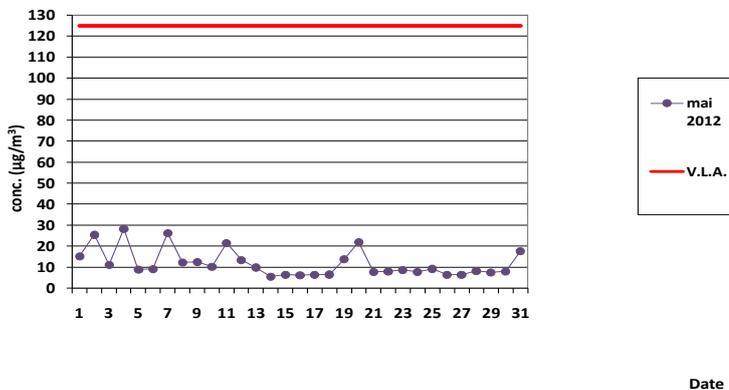


Fig.3. Variation of SO₂ concentrations in May 2012.

The air pollution caused by the car traffic in Tg-Jiu municipality [3] presents two particularities: first of all, the toxic elimination is made very close to the soil and this leads to the accomplishment of

some high concentrations at very low heights, even for the gases having a low density and a high capacity of diffusion in the atmosphere. Second of all, the emissions are made on the entire surface

of the locality, and the differences of concentrations depend on the car traffic intensity and on the ventilation possibility of the street. The volume, the nature and the concentration of the emitted pollutants depend on the car type, the fuel nature and the technical conditions of functioning.

The first measure could be the improvement of the public transport system.

The bus, the trolley or any other public transport should be our main transport methods, too, like in many other civilized countries. But in our country there is a high addiction to the personal car. We may see, especially during the prime times, that many of the cars which are blocked in traffic have maximum 1-2 passengers. We go to work or to school by car, we go to a film by car, we go shopping or to the market by car but most of the times, one is alone in the car. But, there is often no alternative or the alternative is not preferable. The alternative would be the improvement of the public transport by:

- More comfort, meaning the improvement of the buses – new buses, with a lower consumption, with a functional air conditioner, especially during the summer, when the buses are full of passengers;
- Creating an electronic system in the stations, a system that could present the schedule of the public transport means, without asking and waiting;
- Installing video cameras in all the buses and trolleys and establishing and respecting a maximum number of persons which may stand up in the bus. This means that the people should get in only on one door so the driver could stop the overflow. But this supposes an efficient and prompt transport system.

Another solution could be the existence of the bicycle roads. When someone chooses to go by bicycle, it means that they chose a non-polluting and healthy alternative. It is a travelling

way accessible to all ages, but it is less used in Romania. The things we may do in this purpose:

- Creating bicycle roads which are not supposed to start nowhere and to end nowhere, or suddenly crossed by crowded streets. These roads should be connected to streets, to boulevards and to the transport network.
- Increasing the bicyclists' safety by installing road systems for them.
- When a street is built or modernised, it should necessarily have an incorporated bicycle road.
- Creating parking spaces for bicycles near the big commercial centres, schools, hospitals etc.

The circulation limitation on certain streets at certain prime times and the application of some taxes for certain areas could be another solution for reducing the pollution.

This not only reduces the pollution and the blockings, shortens the travelling time and reduces the associated stress, but it also allows the public transport to be more efficient.

But for such an action to be successful, it should be correct and balanced (the taxes should not be too high) and there should be alternatives and stimulants, by means of a trim public transport system.

Another way to reduce the traffic and the pollution could be to build enough parking spaces.

It is found that 30 to 50% of the cars in the traffic contribute to the blockings, slow down the traffic, add stress and useful pollution while looking for a parking space. A problem of creating parking spaces is constituted by the space, and this is a problem exactly in the areas where the traffic is the most crowded. The robotised overground or underground parking spaces would solve this problem.

And we all could contribute to the pollution reduction of our town by being aware of it. The people awareness

regarding the impact of the car traffic on health and the need to reduce it. All of these could be real by making everyone aware of them, both the population and the authorities.

Many people would rather use a bus with the adequate standards than be blocked in traffic for minutes or hours. Many of them would go to the market or anywhere else by bicycles, if it is comfortable.

But the most important thing, like in any other strategy, is to think on a long and very long term, to measure the impact of each decision and to prepare the field before any change.

4.CONCLUSIONS

The sources of pollution with sulphur dioxide are mainly the power

stations of Rovinari and Turceni, the industrial activities and the car traffic of Tg. Jiu, adding, especially during the cold season, the domestic activities by heating the lodgements with different fuels.

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