

# Analyze of the air pollution in an industrial zone

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## ABSTRACT

The paper presents some study in the domain of industrial ecology, regarding the air quality from some industrial zones of Brasov area. The industrial action pollution may be resulted from stationary or mobile sources and also from the increasing of some specific factors such us: gaseous indicators, industrial dusts and precipitation. From the most used metals in industry, the most polluting are: Hg, Co, Cd and Zn, obtained from metallurgy proceedings. Also the industrial sector that pollutes the environment with metallic dusts in general it's the sector of mechanical processing. It is presented some specific aspects about the industrial metallic dust from industry such us: his apparition, his consistence and the deadly effect and also some methods for the atmosphere protection.

## 1. Introduction

The industrial action pollution is resulted that is eliminated into the atmosphere by stationary or mobile sources, these have deadly effects on human and animal health, start photochemical reactions that colour the sky, destroy nature. The pollution of the atmosphere may be the result of increasing of some specific factors such us: gaseous indicators, dusts and precipitation.

From the most used metals in industry the most polluting are: mercury (Hg), cobalt (Co), cadmium (Cd) and zinc (Zn). These metals are obtained from metallurgy proceedings, factories being usually constructed near ores, but after the industrial process they can be transported to other places and worked on there. Also the industrial sector that pollutes the environment with metallic dusts, in general it's the sector of the mechanical processing.

This fact concludes in polluting not just one place but more. Not only do these metals pollute the environment but they accumulate in the human body that leads to damaging the human health.

In the medicine of work, dust is defined as solid particles, capable to remain under solid form. They are formed through the reduction of material to small pieces. Procedures like giving holes, smashing produce particles of dust, having dimensions of those only to be seen at the microscope to those viewable easy by eye.

In a peaceful atmosphere, dust particles are laid at a constant rhythm that measure in centimeters or millimeters per hour. When they are of mineral origin have a non regular form and have the diameter between 10 and 0.1  $\mu\text{m}$  (Stokes's Law). Conforming to this law a particle of dust having de diameter of 0.1  $\mu\text{m}$  lays with the speed of 2mm/h. That also explains why suspensions with fine dust have a great stability and can remain in the atmosphere for a long time.

Important roles to expand dust in the atmosphere have the winds of air produced by machines, human movement, and air systems and ventilation systems.

The monitoring quality of air is an important fact and this is in full concordance to the national and international legislation regarding atmosphere protection as well as scientific research at national and international level in this domain of extreme importance in concordance with the European Directive 96/32 regarding air quality improvement and to population health [1-3].

## 2. Methods of research for researching of the dust quantity on work sites

Knowing the physical and chemical properties of dust there were elaborated numerous methods for researching the grade of dust on work sites. To know characteristics of the work places it is necessary to know dates about:

- concentration and dust dimensions;
- chemical composition
- the evolution of this data and the production process

The calculation of dust in the air can be made through this theory:

$$\text{Dust in air} = (m_1 - m_2) / V; [\text{mg} / \text{m}^3] \quad (1)$$

Where:  $m_1$  - quantity of filter after exposure, [mg];  
 $m_2$  - quantity of filter before the exposure;  
 $V$  - volume of breathing air, [ $\text{m}^3$ ].

Dust concentration in a high quantity of air is expressed through quantities of weight and is called “gravimetical”, also through the number of molecules named “conimetical”. At cabling operations, rubbing with natural stones we can find the largest quantity of dust. Through the point of aggressively the worst dust is the one carrying siliceous dioxide.

The base way of dust getting into the body are the lungs. With the breathing air pending dust get in. Through expiration they are eliminated with the air but with every breath a part of the dust is kept in the body.

Form the quantity of dust inhaled by a worker that works in these conditions, only a small part (approximately 4-5% stays in the lungs). This fact is considered to be mostly because of the qualities of retaining dust of the lungs.

### 3. Methods of preventing pollution with industrial dust

Preventing diseases caused by dust it can be obtained firstly by combating dust, the causal agent of these diseases. These measures can be split in 2 great categories: technical and medical.

Combating the existence of dust at working places, is a complex of technical measurements that have as a purpose forbidding the creation of dust if this thing is possible, it is imposed the reduction of dust concentration in the atmosphere of working places until values reach the maximum required concentration [4, 5].

At applying these measures there must be kept attention at the base principles:

- fighting any kind of dust, because any dust is deadly;
- fighting dust close to the forming zones so that the pending dust from the atmosphere is hard to get rid of;
- isolation of dusty places and getting rid of the dust to other places knowing with detail of the working conditions for judicious methods of fighting dust applying several methods of combat because no isolated mode can't be resolved entirely; ventilation is a good method;
- systematic control and rigorous method of technique application.

For combating dust it is imposed sable to be made with metal. Working places must be separated in special rooms, hermetically closed. Workers that work at these operations will do their job with special suits. For fighting dust in special rooms the highest efficiency of technical methods are the placements of some filters. Before entering in these special rooms there can be made special devices of local aspiration.

### 4. Filters made from tailoring

Are using as a bases element in the main process items from tailoring. After the constructive mode they can be formed under shapes of tubes or bags with plane shapes or combined from 2 forms, fact presented in figure 1.

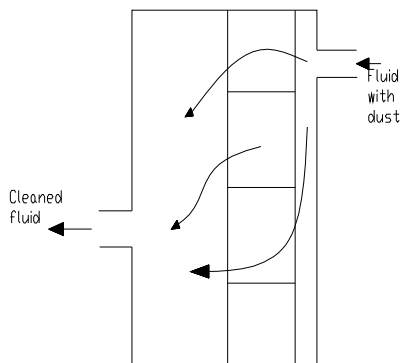


Figure 1: The plan woven filter schem

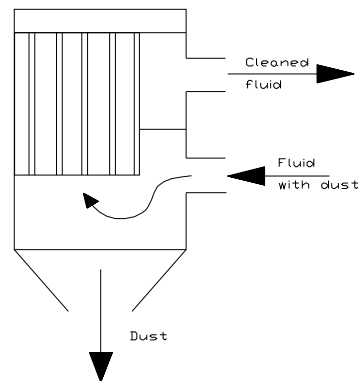


Figure 2: The tubular filter scheme

## 5. Tubular filters

Are in general composed from a numbers of cylindrical tubes pending vertically. In this type of filters the fluid charged with fluid with dust particles is brought or sent by a ventilator in a room of cleaning, fact presented in figure 2.

The fluid gets into the tube and is sent outside through the pores leaving inside the tube containing dust. Because the sedimentation of particles is always rising, these tubs are shacked with the help of some devices at regular intervals.

Tailored items are different used and they are chosen depending on the nature of dust, on the deperated dust and the working technology through the respective technology. They must be both fresh and good mechanical quality and to have air permeability. The physical resistance and chemical resistance of some materials are presented in table 1.

Table 1. The physical resistance and chemical resistance of some materials used for tubular filters

Materials	Temperatures max, [°C ]	Physical Resistance			Chemical Resistance				
		Dry Gaze	Wet Gaze	Vibration	Mineral Acid	Organic Acid	Alkaline	Oxidant	Solvents
Cotton	75-85	G	G	G	X	G	M	M	E
Wool	89-90	M	M	M	M	M	X	X	M
Nylon	115	G	G	G	X	M	G	M	E

E – excellent; G – good; M – medium; X – bad.

The technical and organizing measurements that should be taken by architects and engineers to realize the systematic measurements that should be taken also by medical staff and respecting laws placed by the Ministry Of Environment and Water Supplies are:

- the construction of industrial zones outside the residential zones agreeing stability on the base of calculations of some distances imposed by the polluting industry and homes in so way that the pollution will not reach normal standards;
- modernizing industry with installation that can cope the pollution building higher towers of evacuation and lowering/getting higher pressure and temperature of emission into the atmosphere less pollution;
- increasing green space with trees resistant to pollution.

## 6. Conclusions

The environmental issue is not one of the ecological specialists only, as indeed the environmental has not been assigned to this profession for safekeeping, it being very much a good of us all.

Through monitoring of the air quality in the industrial area and of great population from Brasov its desired that the air quality of this zone to be as the one required national and international standards.

The elaboration and the promotion of clean technologies will lead to a better position in the international eco-industry, an industry in a continue expansion and development.

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