A PRELIMINARY IMPACT STUDY UPON THE ENVIRONMENT FACTORS IN THE CASE OF DEPOLLUTION OF WASTEWATERS FROM THE PULP INDUSTRY WITH MIXTURES OF PHOSPHORIC ACID AND DIAMMONIUM PHOSPHATE

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Abstract: For a long period of time the problem of the economic reability has been given much importance excluding the environmental protection problems. Industrialization has interfered more and more in the natural environment with an effect of deterioration, one of the causes being the exploitation of the natural resources, in the studied case the ligneous mass, without the integral estimation of this.
Through the implementation of the method of quantification of the impact of technological solution proposed against the environmental factors, through graphical representation, the calculation of the quality indices of the environment a conclusion has been arrived at: according to the graphical method, the existent activity through the methods of cleaning has a major impact upon water as an environmental factor, its reduction being at the same time the challenge given by the present research.

Keywords: *impact, waste waters, depollution, quality index*

INTRODUCTION

The environment represents the ensemble of natural and artificial elements in which life evolves or the sum of the factors exterior to the human body such as: the atmosphere, the light, as well as all the other beings. The water, air and soil, constituents of the biosphere are known under the name of environment factors. For the survival of the animal, vegetal and human kingdom the degree of pollution should be reduced for a cleaner and healthier environment.

Knowing of the conditions of life within each medium has lead to an efficient protection. It is essential to have knowledge about the pollutant sources, especially the pollutants that could prejudice the development of live and then their impact upon the environment and upon life, generally.

In order to characterize and control the phenomena that are specific to some types of activities, and to know their impact upon the environment at a certain point, it is necessary for these things to be known through models of global appreciation upon the state of health or of polluting the environment. The first condition that imposes to the applied model is that of allowing for the comparison of the state of environment at a certain time with the possible state in the near future [1 – 4].

So, to characterize, compare and follow the technological phenomena specific to the integrated industry of manufacturing unbleached kraft pulp, that is being used in the obtaining of stationery or commercialized products, it is necessary to know their impact upon the environment (at a certain time).

Determining the impact upon the environment can be considered a positive argument if the capitalization of the research results are taken into account [5 – 7].

METHODS AND DISCUSSIONS

In the last 30 years, a series of methods and techniques of global quantification of the impact with variable complexity, have been elaborated; because of the nature of the aspects of the problems that are being analyzed and the models of analysis that are based on a criteria that permits the combining of more factors. In order to evaluate the impact upon environment, the implementing of the methods is given in literature [8 – 10]. In order to define the impact in specific conditions of treating the sulfate effluent, the pattern of the appliance for the manufacturing of the kraft pulp belonging to the S.C. AMBRO S.A. Suceava, has been offered as a reference.

The waste waters that comes from S.C. AMBRO S.A. is discharged into the Suceava river after a preliminary treatment in the municipal wastewater treatment plant. The indices of the discharged effluent must be situated between the limits imposed by the Normative of the quality of the evicted effluent, NTPA 002/2002, as it follows: pH = 6.5 – 8; fixed residue at 105 ^{0}C = max. 300 mg/L; COD(Cr) = max. 500 mg/L.

The quantification of the impact produced by the waste waters that comes exclusively from the analyzed unit is abstract so, the unframing of the effluent at certain indicators cannot be put exclusively on behalf of the analyzed company. In order to evaluate the impact upon the environment, two methods have been used: the method of the quality of the environment index/value and the graphical method.

Determining the Quality/Index Value I_c

For a general appraisal of the grade of pollution, the method based on the calculation of some indices of quality has been applied.
The following marks have been used in order to solve the proposed problem: Unsatisfactory – grades 1, 2, 3; Satisfactory – grades 4, 5, 6; Good – grades 7, 8; Very good – grades 9, 10.
In the case of the softwood unbleached kraft pulp plant, only the quality of the effluent remained at the level of the documentations in vigor.
The effect of the waste waters that comes from the bleaching process through precipitation with phosphoric acid and diammoniumphosphate (DAP) upon factors of environment - is appreciated with the mark good (grade 7). The mark insufficient is maintained, the general existential situation for the air pollution, the cause being the discharges without capture and deodorization through the recovery plant of gases that come from the pulping plant.
The explanation for the influence of pollution upon the soil with effects marked with 4 is given by:

- the accidental overflow of the waste waters that comes from pulp manufacturing and form the paper goods manufacture,
- the bestow/storage of the raw material with abnormalities from the technological norms/standards essential for the industrial process,
- the sediment from the cleaning plant of the waste waters.

The urban establishments are affected by the storing of the waste and of the sediment and by the discomfort created by their inadequate storing.
The quality index can be found out by applying the following formula:

$$I_C = 1/E$$

where E represents the sum of the effects upon environment [11].
The environment quality index is an indicator for the appraisal of the level of pollution in the conditions specific to the technological manufacturing of the unbleached Kraft pulp and of the paper goods. For the estimation of the environment index the following presentation is given in the table 1.

Table 1. *Impact evaluation*

Sources of pollution	water	air	soil	urban establishments
Storing of the raw materials and of the sediment from the equipment that treats the waste waters	0	0	– 4	– 1
Diffusion of pulp water from the washing stage, with the following mentioning: accidental overflow	+7	0	0	0
Pulping and sodium salts recovery stage	0	– 3	– 4	0

The quality indices that resulted are the following:

$I_{C\ for\ water} = + 0{,}143$ $\qquad$ $I_{C\ for\ air} = – 0{,}333$

$I_{C\ for\ soil} = – 0{,}250$ $\qquad$ $I_{C\ for\ urban\ establishment} = – 1.0$

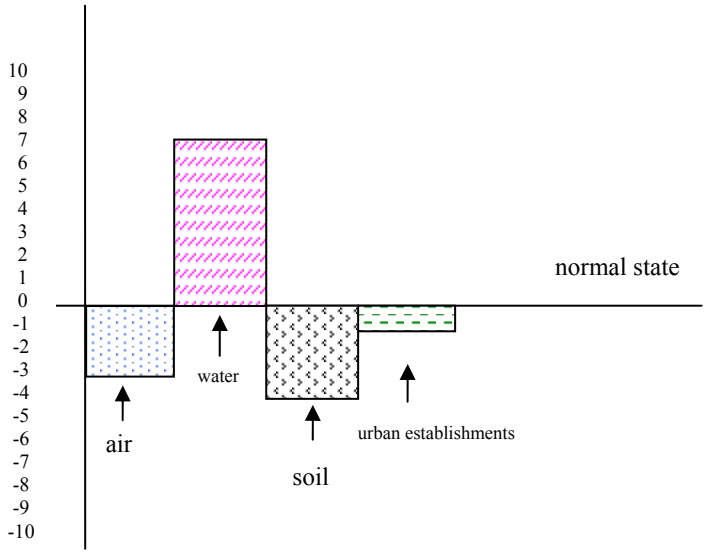

Figure 1. *The effects upon the environment factors during the conditions of depollution on the discoloring process – the precipitation of lignin with mixture of H_3PO_4 and DAP*

The Graphical Method

The evaluation of the impact upon the environment through the use of graphical method has been particularized for the results of the applied research program. This method describes a simple quantification of the environment factors and can be taken into consideration as a ground principle of appraisal.
The following usual marks have been used: Insatisfactory – grades 1, 2, 3; Satisfactory – grades 4, 5, 6; Good – grades 7, 8; Very good – grades 9, 10.
In the case of the industrial plant, it seems that the sewage does not have a major influence because they are not directly viewed.
The discharge of gases into the air represents a major impact when they are produced through the process of sodium salt recovery from the pulping phase and the disposal of the gases resulted from the process of sodium salt recovery and of the organic compounds existent in the residual black liquor. These have been evaluated with the grade 3.
A special case, marked with 7, refers to the effluent resulted from the appraisal of technical solutions anticipated in [12]. The soil has received the qualification 4, a real situation until the modernization of the soil quality through retechnologization, that anticipated a raising of the reability with 2 points.
The graphical representation for the three situations: the real, the forecasted and the ideal one is rendered in figure 2.

CONCLUSIONS

Nowadays, the industry, transports, the urban congestion and even the battles affect the environment in a profound and even irreversible way. The environmental disorders can

influence the immunity system of the livings, can activate the microbes, and can generate new viruses, their effect leading to the arrival of new epidemic cases. The worst forms of manifestation concerning the deterioration of the environmental components imply a change of this optics. It would be ideal for the technological processes and flows to be designed and exploited at industrial level in close connection with the requirements of the environmental protection, so as, its components (water, air, soil) should not be deteriorated or influenced in reduced proportions [13].

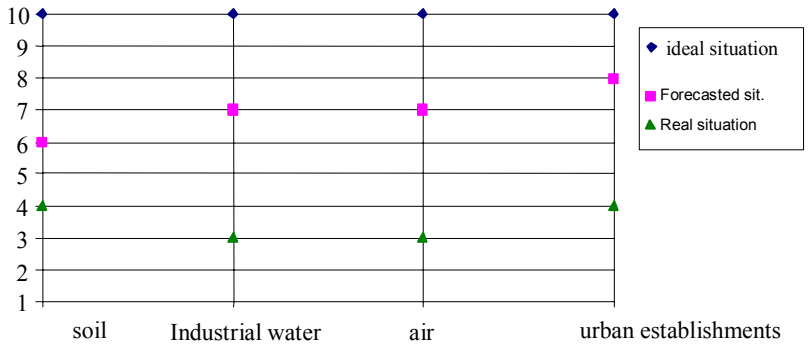

Figure 2. *The graphical method of the depollution grade of appraisal*

The technical-economic component must facilitate the actions that have a pragmatic character and with an immediate effect.

The experimented technologies applied with a view to reduce hardly biodegradable pollutants (the lignin ingredient) through precipitation in acidic environment and with an immediate effect in the bleaching of the effluent, that initially have a color that varies from dark brown to black – have presented a guarantee through the results obtained.

The precipitation of the lignin ingredients with phosphoric acid in mixture with DAP allowed, in the conditions of the working parameters: a temperature of 20 ^{0}C, a duration of 14 minutes and the bleaching of the waste waters with a 95% effective power of consumption of about 7 – 9 mg/100 mL waste water.

The reduction of the hardly biodegradable components through precipitation with phosphoric acid with 90% effective power at a consumption of 0.5 kg phosphoric acid/1 m^3 of effluent with an organic load has been evaluated with maximal values of 14%.

The estimation of the grade of pollution for the sulfated residual water resulted from the phases of scale removing, washing, sorting and recovery has been realized through the determining of the fixed residue at 105 ^{0}C, the organic compounds from the fixed residue, the chemical consumption of oxygen implicitly through COD(Mn) and BOD_5, the pH, the identification of the color through photometric methods.

Applying the proposed solution presents the following technical-ecologic advantage: the elimination from the circuit of the waste waters of the hardly biodegradable components through precipitation and separation from the system.

Through the bleaching of the waste waters and the reduction of the grade of pollution produced by the organic components, solution with a direct effect on the quality of the surface waters, the effluents resulted after the separation of the lignin from the precipitate can be cleared only in the secondary phase of biochemical cleaning.

The use of the phosphoric acid and of the DAP presents the following advantages:

- the separation through precipitation of the lignin with direct implication in the bleaching of the waste waters;
- the exceeded used reactive can constitute direct nutrients in the processes from the biochemical wastewater treatment, improving them in these conditions of use.

In order to realize the proposed solution we suggest the supplementation of the existent cleaning equipment with the phase of filtration and drying of the lignin in the conditions of its improving or the pumping of the precipitate after decantation at the sediment equipment where it is incinerated.

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