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Optimizing Production Costs by Redesigning the Treatment Process of the Industrial Waste Water

Jozsef Boer[a], Petruta Blaga[b,*]

[a,b] *"Petru Maior" University of Tirgu-Mures, 1 N.Iorga, Tirgu-Mures, 540088, Romania*

Abstract

This paper aims at presenting a solution for the treatment of industrial waste water, resulted from the process of chemical pretreatment in the electrostatic painting industry, which can also supply water decontamination, thus preventing environmental destruction. The proposed technological process can be optimized by redesigning the pretreatment process by changing the path of the waste water and redirect it in the system created within the company, based on the observations noted during two years of sampling and testing. The results have been confirmed by the fact that through the implemented system, the waste water, can be efficiently cleaned and re-entered in the work process without affecting the quality of the process the pretreated products. By using this system lower production costs were achieved. This was possible by reducing the amount of water used from the distribution network, as well as by reducing the amount of chemicals needed for the pretreatment of contaminated water.

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Keywords: waste water; chemical pre-treatment; electrostatic field painting; contamination; production costs

1. Introduction

Wastewater is the main source of natural water pollution due to their discharge to receivers. Through water pollution we comprehend the alteration of physico-chemical and biological characteristics of water due to human activities and that makes the waters become unfit for use. Wastewater compositions depend on their origin they may

* Corresponding author. Tel.: +40-074-437-8121, +40-074-815-1922; fax: +40-026-526-2275.
E-mail address: homecomplet@gmail.com; petruta.blaga@upm.ro

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be domestic sewage and industrial wastewater. To avoid the pollution of natural waters, wastewater discharge is permitted only after they have been treated so that they reach the parameters that do not endanger the environment [1]. Parameters of discharged waters are regulated by two standards namely NTPA 002/2002 for discharged waters into sewage systems and NTPA 001/2002 for waters that are discharged into natural receptors. To achieve these parameters wastewater treatment differs depending on their origin. Wastewater treatment processes are generally mechanical, physico-chemical or biological: anaerobic or aerobic.

The paper aims to present a solution for industrial waste water treatment as a result of the chemical pretreatment process form the painting industry in electrostatic field both protecting the water and the surrounding environment.

The proposed technological process optimization, involves the re-projection of the pretreatment process with the change of the track of the waste water and redirecting it in a system mad by the firm based on observations realized within two years of tests and samples.

The results have confirmed the fact that with this system we can provide an efficient waste water cleaning and reintroducing them into the working process, without affecting the quality of the process and the pretreated products, also there have been made cost reductions [2] of the production with this system, reducing the used water quantity from the distribution network, also reducing the necessary chemical substances for the pretreatment of the contaminated water.

Electrostatic field painting is a part of the treatment, coating and decorating activity of metal surfaces. A category of the field painting category is powder painting.

Within this painting water is used as an element for making degreasing solutions, pickling, passivation or conversion, without forgetting the rinse before and after the upon mentioned processes.

After these operations waste water appears as a result of the chemical pretreatment process of which the product is put before being paining in electrostatic field.

2. Theoretical foundations

Waste waters are classified into: sewage channel (or municipal) and industrial waste water.

Quantitative waste waters contain 99,95 % water and just 0,05% impurities such as organic or inorganic, soluble or insoluble, degradable or non-degradable substances, substances which if introduced to the natural circuit can rise major problems contaminating the surrounding environment [3].

After the degree of contamination, industrial waters are mixed with municipal waste waters ant treated together, followed by discharging them into the rivers, or they are treated separately and they are reused in the industrial process.

Waste water treatment [4] has three main stages:

- *The primary treatment* consisting of sedimentation or sieving operation to remove more than the size of the colloidal particles. At the same time remove 30-60% of the BOD.
  Primary treatment consists of the collection of the waste water using draining under gravitation. The large objects are removed, this is realized with grills and sieves. Deposits are stored in pits or incinerated. After that waste waters are decanted in decanters, in which are put the smaller solid parts. The bottoms of these decanters are tilted and their flow speed is small, these coagulants are added to remove finer suspensions.
- *Secondary treatment* ensures removing colloidal or dissolved materials, reducing BOD. This process is a biological treatment, the growth of microorganisms using water as food residues.
  Secondary treatment consists of a biological treatment operation, performed in two versions:
  - natural – where the filtrate environment is the soil on which the waste water is spread, on the surface of the soil a biological membrane is formed which retains the substances of the waste water and with the presence of the air and the microorganisms takes place a transformation and elimination process;
  - artificial biological – by different mineral environment flirtation: crushed stone, slag, brick, and cokes. This is the most used biological treatment method or active sludge processes in which the active sludge flocks are suspended in the moving flow. The sludge is collected and removed by rotary filters.
- *Tertiary treatment* is applied to water reuse in the industry.