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IMPROVEMENT OF WASTES QUALITY OF FERTILIZERS INDUSTRY

By
Marwa Abdel Fattah Abd Alla
B.Sc. Eng. (Civil), Benha University, ٢٠٠١

A Thesis Submitted in Partial Fulfillment
of
The Requirement for the Master Degree
in
Environmental Science

Department of Environmental Engineering
Institute of Environmental Studies & Research
Ain Shams University

٢٠١٠

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Abstract

Nitrogenous fertilizers industry is one of the most harmful sources of pollutants for water resources. The main pollutants of this industry are nitrate, nitrite, and ammonia. This study aims to reduce the concentrations of these three pollutants to reduce their effects on environment. Treatment by slag (industrial waste), natural clay from Aswan (Hebba) and ١:١ mixture of slag - charcoal were carried out.

Treatment by ١:١ mixture of slag – charcoal shows high percent removal more than treatment by slag only, while Hebba shows comparable removal percent with slag – charcoal mixture.

Treatment by using ١:١ mixture of slag – charcoal reduce concentration of nitrate (NO_3^-) from ٥٩,٦٠٪ mg/l to ٢٦,٧٢ mg/l, nitrite (NO_2^-) from ٧١,١١ mg/l to ٢١,٦٩ mg/l and ammonia (NO_4^+) from ١٤٦,١٠ mg/l to ٧٣,٣١ mg/l, while treatment by using natural clay (Hebba) reduce concentration of nitrate (NO_3^-) from ٥٩,٦٠٪ mg/l to ٢٧,٨٩ mg/l, nitrite (NO_2^-) from ٧١,١١ mg/l to ٣٣,٠١ mg/l and ammonia (NO_4^+) from ١٤٦,١٠ mg/l to ٦٥,٢٢ mg/l.

Natural aeration was applied to reduce ammonia concentration in samples due to its volatile nature. It was applied on samples treated by Hebba (as a case study). Natural aeration reduces concentration of ammonia from ٦٥,٢٢ mg/l to ٩,٥٤ mg/l.

Concentrations of nitrate, nitrite and ammonia in treated industrial wastewater are compatible with Egyptian Environmental Laws for discharging into non dulcet water and suitable for using in livestock and poultry, agriculture (crops tolerate high saline water like barely, cotton, date palm and wheat) and for industrial use.

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Chapter I

INTRODUCTION

١,١. Study Problem

Egypt has been facing increasing problem of pollution affecting its water resources. Major water bodies in Egypt are receiving loads of domestic, industrial and agriculture pollution loads due to the inadequate and insufficient treatment facilities. This deterioration in Egypt's water quality threats the beneficial use of water.

In addition, pollutants have their bad effects on human being and environment according to their chemical and physical properties.

The industrial wastes represent the most harmful source of pollutants for water. The progress of industrial and technical development increases the amount of polluted wastes. The pollutants may be liquids, solids and gases, which reach to the ground or surface water, mostly without treatment. Pollution of water sources is harmful for the health of human being.

There are no boundaries between different environmental surroundings (solid, liquid, gas). Therefore any pollution to one of them is easily transferred to the other.

Pollution of environmental surroundings results from suspended solids and inorganic dissolved matters, bacteria, algae, radioactive materials, acids, bases and salts.

All the above pollutants come from one of the following sources:

١. Domestic wastes

٢. Pesticides

٣. Fertilizers
٤. Industrial wastes
٥. Oil leakages and his slips and pipelines.
٦. Tourist activities e.g. water crimes at rivers.

١,٢. Aim of the work

The present study aims to reduce concentrations of nitrate ($NO^{٣}$-), nitrite ($NO^{٢}$-) and ammonia ($NH^{٤}$+) in industrial wastewater of nitrogenous fertilizers factory by using slag, one to one mixture of slag plus charcoal and natural clay from Aswan commonly known by Hebba. Then, natural aeration is applied to reduce concentration of ammonia due to its nature volatile. The concentrations of nitrate, nitrite and ammonia in treated industrial wastewater must be compatible with Egyptian Environmental Laws for discharging into non-dulcet water because the studied factory drains its wastewater to non-dulcet water.