بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

TREATMENT OF PHARMACEUTICAL INDUSTRIAL WASTEWATER

By

Sahar Saad Ali Ahmed

B. Sc. (Chemistry) 1990
Faculty of Science, Assiut University

A Thesis Submitted in Partial Fulfillment

Of
The Requirement for the Master Degree

In
Environmental Science

Department of Biological and Physical Sciences,
Institute of Environmental Studies and Research,
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2002

APPROVAL SHEET

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Abstract

ABSTRACT

"Treatment of Pharmaceutical Industrial Wastewater"

Sharkawy , S. A. Sahar

Effluents of pharmaceutical industry are characterized by high organic load and the presence of inhibitors to biological treatment such as disinfectants. Different physico-chemical techniques are applied for conditioning the effluent prior to treatment by activated sludge to reduce the organic load.

In this study, experimental investigations were carried out to study the operating conditions affecting activated sludge process. The investigated effluents were synthesized wastewater, wastewater containing disinfectant, cough syrup and gargle solution. The following parameters have been investigated: retention time (1, 3, 6, 9,...,24 hr) food to microorganism ratio (0.1, 0.2, 0.3, 0.5, 0.6, 0.7, 0.88, 1) at pH=7 and synthesized wastewater concentration (500-2200 mg/l). The effect of inhibitor addition on the performance of activated sludge process and the effect of starch addition on COD removal efficiency at different inhibitor concentrations were also investigated. Furthermore, the kinetic coefficients of the process were deduced for the different studied wastewater under different operating conditions.

This study concluded that the optimum conditions for activated sludge were: pH = 7-8, retention time=16 hours, food to microorganism ratio = 0.62 for the investigated compositions. The maximum COD removal efficiency obtained under these conditions were 95% for synthesized waste and 78% for wastewater containing disinfectant. Further, the activated sludge process could tolerate disinfectant of concentrations up to 100 mg/L. Also, in the case of treating wastewater

containing cough syrup and gargle solutions, COD removal efficiency increased by increasing the concentration within the investigated range. The analysis of the process kinetics for the different treated solutions have been conducted according to the equation $C = C_0 \text{ Exp } (-Kt)$. The rate constants obtained were: 6.8701 day^{-1}, 1.4995 day^{-1} and 2.0878 day^{-1} for milk, disinfectant and disinfectant with starch solutions, respectively. The presence of starch as a co-substrate is beneficial for the performance of activated sludge process. The highest COD removal efficiency was obtained at optimum dose equal 60 mg/l.

Thus, the study contributes to the development of activated sludge technology when applied to treat the pharmaceutical wastewater. Further, adapting the activated sludge hetero culture is an essential step for successful and efficient removal of specific priority pollutants.

Keywords: Activated sludge process, Pharmaceutical industrial wastewater, Treatment, Kinetics, Optimum conditions.