Experimental study on reuse of wastewater effluent for agricultural consumptions

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Abstract: According to the problem of water shortage in countries, water provision has great importance presently. In such a situation, reuse of purified sewage can be considered as a way to overcome water shortage. Therefore, a research performed on the wastewater of sewage filtration plant in the Susangerd city in Iran, which is anaerobic and optional pool, during six months.In this study, qualitative criterions of output wastewater of sewage filtration plant like BOD5, COD, TSS and general Choliform were studied and evaluated weekly and monthly. The average of performed tests and analysis on the output sewage indicates that the amount of parameters BOD5, COD, TSS and general Choliform had been 73.5, 173, 72.5 milligram in litre and 7.8×10^5 in each 100 millilitre and the quality of purified sewage in comparison with the standards of World Health Organization (WHO) in order to reuse in agricultural consumptions is in agreement with all paramenters except for MPN. Thus, in the case of reusing the wastewater for watering green and agriculture, the reduction of microbial pollution should be considered according to the standards of Iran environment organization and recommendation of World Health Organization (WHO) and quality of this effluent is classified as acceptable for irrigation. [Journal of American Science 2010;6(9):256-260]. (ISSN: 1545-1003).

Key words: Sewage filtraction; reuse of wastewater; Susangerd city; agricultural consumptions

1. Introduction

In charting and doing the project of the refinery of the additional water and reusing of additional water with attention to the kind of using and the way of using and probability of contacting of man by that, the different quality of refined additional water will be accepted. But every ways of reusing had limits, but refined additional water as a resource of available water is accounted and even in the years witch there is the shortage of water, the refined additional wate less will affected by the shortage of water. Also the refined additional water as a confidence resource will be used for the new using. The establishment of sewage filtration plants is often accompanied with considerable investment and great exploitation cost. Therefore, correct exploitation and preservation of these installations has significant importance in the investments output. In order to keep and preserve the installations of sewage filtration plants, optimum exploitation and the study of function and application of installations, it is necessary that sewage filtration plants will be considered and evaluated according to present installations concerning efficiency and qualitative and quantitative function. Considering the problem of water shortage in the world, wastewater reuse is one of the most importance successful methods to overcome the problem of water shortage.

Considering the problem of water shortage in the world, wastewater reuse is one of the most importance successful methods to overcome the problem of water shortage. In order to supply water for irrigation and to control the environmental pollution in the standards of Iran, the wastewater treated and then reused for irrigation of trees and green fields by using the extended Stabilization ponds system. In the present case study, we have evaluated the wastewater treatment process used for watering green and agriculture and ways for upgrading its performance [APHA, AWWA, WPCF. ,1995]. Stabilization ponds have high capability for trearing the wastewater eith high organic and hydraulic loading. Hence this system is popular means of wastewater treatment for for agricultural consumptions.

Oswald by presentation of a simple design of stability in California had reported that in the case refinery has a high degree that we can reuse it´s drainge (Oswald,W.,1972).

Poordara, et al (2005) studied the using hospital wastewater effluent for irrigation of green fields. In this study pH and the content of BOD5, COD, TSS and MPN in raw wastewater was 7.2, 330mg/l. 460mg/l, 280mg/l and 4.1×10^{8} MPN/100ml and 35×10^{8} MPN/100ml respectively. The efficiency of this system for removal of BOD5, COD, TSS, MPN was 86.4%, 83.7%, 78.6% and 99.15% respectively. With respect to the water quality standart prepared by Iranian Environmental Protection Organization, the quality of this effluent is considered to be suitable for agriculture except for MPN which is decrease by increasing the detention time during chlorination.The important parameters of water quality shuch as EC, SAR, Na% in the effluent were 420 µs/ml, 2.5, 37.5 respectively and the quality of this effluent is classified as acceptable for irrigation.

The Susangerd city in the west north of Ahwaz in Khouzestan (Iran) and in the bank of Karkheh river as Aname of Nisan is located, and now is the center of formal officienary and commercial unit of Dashte Azadegan. Now in average 21260 m^3/s are entered to he refinery, which among these home drainge allocated to it self the most amount of drain. The capacity of refinery is 21000 m^3/s in a day and now the phase one of this refinery because of leakage of little pool and small depth of design is useless. The process of refinery in cluding 2 lagon of nonairlibing creatures and 4 deliberately lagon.

2. Material and Methods

The main objective of this study was to investigate the efficincy of stabilition ponds for treating a high organic load wastewater receiving effluent from a of sewage filtration plant in the Susangerd city in Iran. The efficiency of Stabilization ponds wastewater treatment plant was studied over six months from March 2008 to August 2008. The general conditions and operation of the plant were considered and some wastewater treatment indexes such as BOD5, COD , TSS and Total Choliform in influent and effluent were determined. The average amounts of TSS, BOD5, COD and Total Choliform in influent were 187.5 mg/l, 122.6 mg/l, 281.5 mg/l and 1.04×10^{12} MPN/100ml respectively (Table 1). The average amounts of TSS, BOD5, COD and Total Choliform in effluent were 72.5 mg/l, 73.5 mg/l, 173 mg/l and 7.8×10^{5} MPN/100ml respectively (Table 2).

Table 1. The average of performed tests and analysis on the influent sewage indicates that the amount of parameters

Average	Aug. 2008	Jul. 2008	Jun. 2008	May 2008	Apr. 2008	Mar. 2008	Parameter
122.6	75	145	105	91	162	158	BOD5 (mg/l)
281.5	160	375	287	230	327	310	COD (mg/l)
187.5	256	141	135	150	212	321	TSS (mg/l)
1.04×10^{12}	24×10^{13}	45×10^{13}	11×10^{14}	11×10^{11}	93×10^{12}	---	Total Choliform (NO/100ml)

Table 2. The average of performed tests and analysis on the effluent sewage indicates that the amount of parameters

Average	Aug. 2008	Jul. 2008	Jun. 2008	May 2008	Apr. 2008	Mar. 2008	Parameter
73.5	63	79	65	58	91	85	BOD5 (mg/l)
173	153	210	174	130	210	160	COD (mg/l)
72.5	107	102	43	39	91	53	TSS (mg/l)
7.8×10^{5}	15×10^{4}	91×10^{2}	14×10^{4}	20×10^{3}	75×10^{9}	---	Total Choliform (NO/100ml)

3. Results and Discussions

The quality of the plant effluent has significant different with the standard limits recommended by World Health Organization (WHO). The obtaining results from done experiments on influent and effluent from a of sewage filtration plant in the Susangerd city in Iran (Fig. 1 , 2 and 3). The average amounts of TSS, BOD5, COD and Total Choliform in effluent were 72.5 mg/l, 73.5 mg/l, 173 mg/l and 7.8×10^5MPN/100ml respectively. The results showed that the effluent could be used for irrigation based on the recommended standard by World Health Organization (WHO). The efficiency of this system for removal of TSS, BOD5, COD and Total Choliform was 60%, 38%, 36% and 9504% respectively (Table 3). With respect to the water quality standards prepared by World Health Organization (WHO), the quality of this effluent is considered to be suitable for agriculture except for MPN which is decrease by increasing the detention time during chlorination (Table 4). Also the comparison of the average number of Total Coliform in effluent with the microbiological quality guideline of World Health Organization (WHO) showed that the effluent was not acceptable for use in unrestricted irrigation (Fig. 4 and 5).

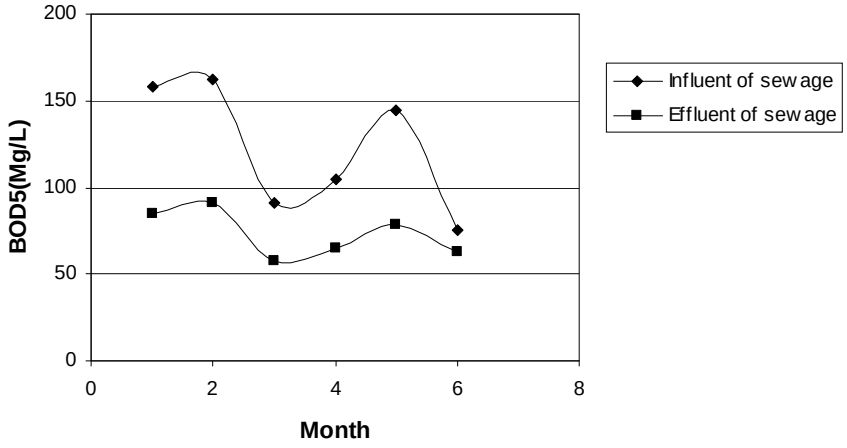

Figure 1. Variation of BOD5 in influent and effluent sewage

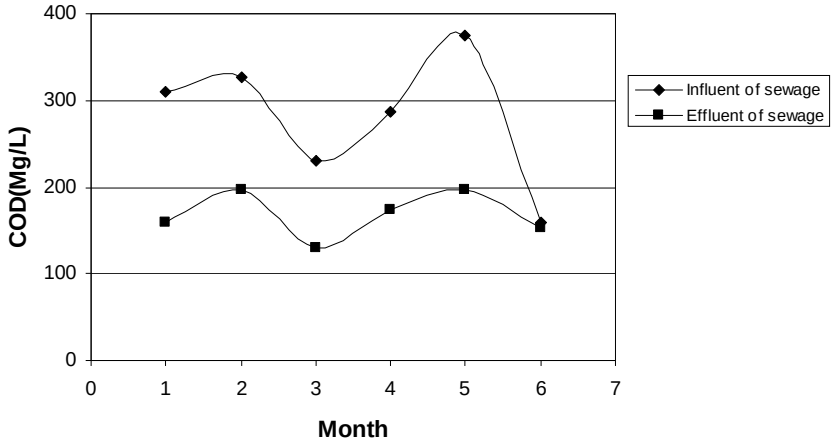

Figure 2. Variation of COD in influent and effluent sewage

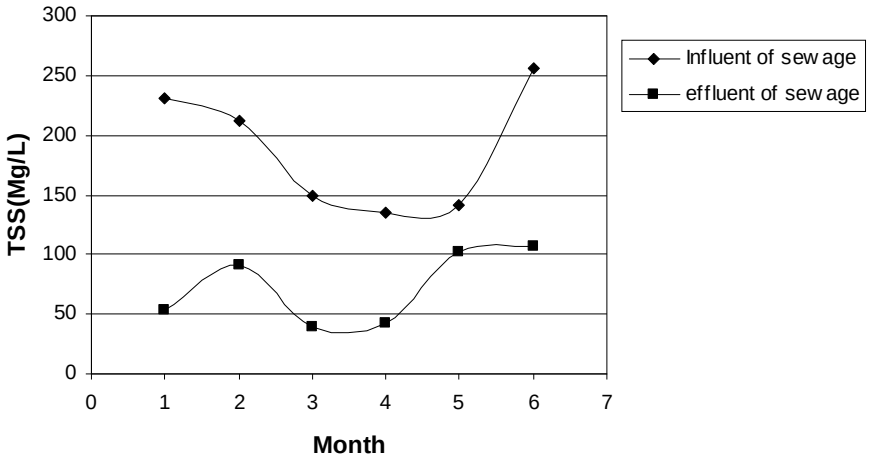

Figure 3. Variation of TSS in influent and effluent sewage

Table 3. The efficiency of this system for removal (%)

Average	Aug. 2008	Jul. 2008	Jun. 2008	May 2008	Apr. 2008	Mar. 2008	Parameter
38	16	46	38	36	44	46	BOD5
36	5	44	40	44	36	48	COD
60	58	28	68	74	57	77	TSS
95.4	100	80	100	100	99	---	Total Choliform

Table 4. Standard of World Health Organization (WHO) for agriculture (WHO, 1989)

Amounts of Suitable for Agriculture	Average of effluent	Parameter
100	73.5	BOD5 (mg/l)
200	173	COD (mg/l)
100	72.5	TSS (mg/l)
1000	7.8×10^{5}	Total Choliform (NO/100ml)

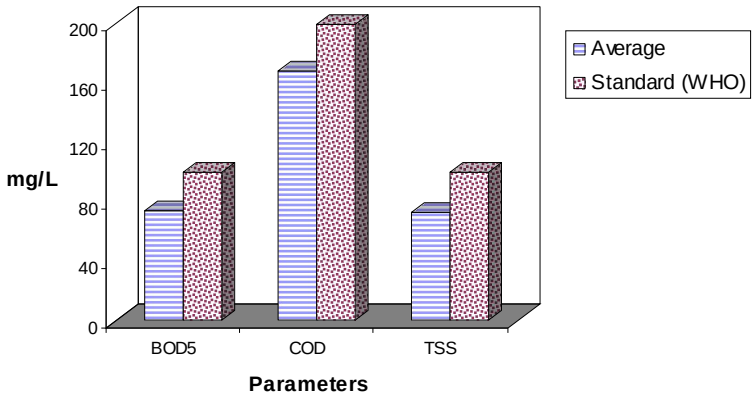

Figure 4. The average amounts of TSS, BOD5, COD in effluent

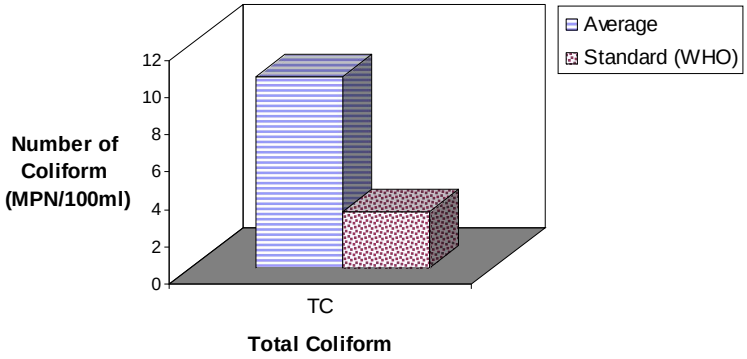

Figure 5. The average amounts of Total Choliform in effluent

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