Process of self-purification of wastewater by using soil

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1.Introduction

As we all know that the soil contains large number of microbes forms including algae, fungi, and bacteria, which plays an important role in the many biological wastewater treatment processes. Soil microbes plays important role in degradation of organic matter and removal of nitrogen and carbonaceous compound. Thus, presence of these microbes can be prove effective in the biological treatment of the waste waster. On the basis of this concept, the research deals with the purification of the leachate obtained from the landfill site of Amagasaki in the presence of microbes on the soil.

2.Experimentation method

Experimentation site is set as shown in fig. 1. A concrete container of 46.5 m^3 (1.55m high, 3m wide and



inside soil. No. 1-4 are different effluent for leachate passed.

2.1.Leachate analysis

The leachate, which is collected in the tank from the landfill site, was allowed to pass into the pipe using the pump. The effectiveness of the purification of the leachate was examined by comparing the effluent from 4 different outlet and influent leachate as well as the soil. Out of these four different outlet, data of No. 4 outlet is not so reliable, hence the data has been omitted. Since the

leachate has been supplied since last 2 years, the supply of the leachate was stopped from the August till November of



2006 so as to retain degradable potentiality of the soil.

2.2.Soil analysis

For the soil analysis, the soil besides the pipe was divided into four parts horizontally and three parts vertically as shown in the figure 2. The soils were collected from those points with the help of boring equipment of diameter of 18mm. The sampled soils were then mixed with distilled water/soil volume ratio of 2.5. The filtrate was collected and various analysis like pH, EC, TOC, TN, bacterial number, ratio were carried out.

3.Results & discussion

3.1 Regarding the leachate

3.1.1 pH: Fig 3 shows the comparative study of pH with the time. From the graph, it was found that the pH of the influent shows the high alkalinity of around 11 but

after the purification the effluent showed the pH almost around 7-8.This decrease in pH in effluent may be due to the buffering effect of the soil



formation of acids from the decaying organic matter

3.1.2.Purification ability on TOC: It was found that influent TOC lies between 200-500 mg/L while the TOC of effluent has been lowered to almost less than 200 mg/L.

While considering the decreased TOC % in compared to influent, it was found that the TOC of the



→ influent ***** effulent → average pecent Fig. 4 Comparative study of TOC of influent, effluent & decreased TOC%

effluent has been reduced by average 60%. Further, it has been found that this ratio decreases with time. Thus, it can be said that potentiality of the microbes to decompose the organic matter decreases with time period in 9 months. 3.1.3.Purification ability on TN: It was found that TN of the effluent as compared to the influent has been decreased by 20-40%, average being 34%. Further it has

also been 240 100 e decreased in %) TN (%) 200 found that - 160 160 E 120 about 80% of nitrog-20 ខ្ល 40 en has Ner 0 0 heen 0 400 800 200 600 Total elapsed days (day) converted influent into NH₄⁺ effluent average % of decreased TN and less fig. 5 Comparative study of influent effluent TN & % of decreased nitrogen amount

into NO_3^- & NO_2^- . On this basis also it can be said that soil has been aiding in the breakdown of nitrogen compound

3.2.1. pH : Fig. 6 shows the comparative study of soil

3.2. Soil analysis



source		Influent	No. I	No. II	No. III
		(061129)	(061129)	(061129)	(061129)
Ammonium	mg/L	70	15	21	31
Nitrate	mg/L	2.8	5.9	8.7	9.1
Nitrite	mg/L	0.02	1.5	0.07	0.30

Table 1:Amount of nitrate, nitrite in the soil

3.2.2.TOC: Regarding TOC of Aug & Nov. it has been found that the TOC level of Aug was found to be very high in compared to the Nov. Further, it was found that the TOC has been increased in the depth of 30-60 cm in August while it has been found that it is just reverse during Nov. Since the leachate was continuously supplying in the month of August, the region near the pipe showed the higher TOC level. while in case of Nov. the probable reason might be due to presence of large number of microbes and decomposition of the organic



matter during the period as the leachate supply to the trench was stopped after the August.

3.2.3.Bacterial number on soil: Fig.8 shows the microbial number of two different months. Presence of these microbes plays an important role in the decomposition of the organic matter present in the wastewater. It was found that the number of microbes are



higher in November than August, hence this can also be one of the factor affecting on the lower TOC level in November.

4.Conclusion

It was found that TOC has been decreased by around 60% & TN have decreased TOC by 30%. Further, , it was found that the soil has been capable of lowering the pH of the leachate. Further, in the area near the trench, TOC has been high due to the continuous supply of leachate in August & decrease in Nov. due to potentiality of large number of microbes near the trench. It was also found the effective time period for the microbes to decompose the organic matter is around 9 months.

References

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