Neutralizing TNT Acidic Wastewater With Neem Leaves Powder

Khalid Hamid Awadelseed^{*§}, Abdelmoneim Massad Abdalla^{*¶}

^{*}Karary University, Khartoum, 12304 Sudan

[§]Khalidco20@gmail.com, [¶]aabdelmoneim_massad@yahoo.com,

Abstract

This study conducted to substituting of $NaOH$ used as a neutralizing agent for acidic wastewater generated from manufacturing of TNT in factory of Sudanese Military industries by natural material such as Neem leaves powder. The requirement for pH values of wastewater to be disposed over 6. Four weights (5, 7.5, 10 and 12.5) g of dry Neem leaves powder prepared and added to four samples of acidic wastewater with volume of 100 ml for each samples, the pH values of wastewater measured after four periods (1, 2, 3 and 4) hr for each weight added. The results showed the pH values raised from 1.7 to 6.94 and no any residual salts observed. The Neem leaves powder is effective alternatives for sodium hydroxide to neutralizing acidic wastewater at TNT plant.

Key words-Biotreatment, Neem, Acidic wastewater, Explosive factory.

I. INTRODUCTION

Mainly Land treatment processes [1]–[4] commonly termed natural systems, combine physical, chemical, and biological treatment mechanisms. Neem tree (*Azadirachta indica*) belongs to family Meliaceae grows naturally in Asian countries, especially Indian sub-continent. Neem tree is known to have medicinal properties [4] since long. It has been reported earlier that, its different parts contained several medicinal, insecticidal and antibacterial properties [5]–[11].

Neem leaves are often used for cleaning turbid ground water which may be applied in rural [12]–[15]. Previously studies [15] used Moringa leaves to treat acidic wastewater with pH 1.7. Moringa leaves raised pH to 5.8 in three hours by adding (NaOH) pH reached 6. The aim of this research is to find a new method of treating an acidic wastewater by Neem leaves powder, because Neem leaves is natural alkaline product.

A. Material and Methods

B. Material

Two liters of acidic wastewater from factory of Sudanese Military industries with pH 1.7 have been obtained, 500 g of Neem leaves powder have been prepared. pH meter (arm filed).

C. Methods

The experiments have been carried out in factory of Sudanese Military industries chemistry laboratories, amounts of (5.0, 7.5, 10 and 12.5) g for leaves powder. Neem leaves powder have been added to conical flasks and then filled with a 100 ml of acidic wastewater. Four testes at (1, 2, 3 and 4) hr have been carried out at 35°C by pH meter.

II. RESULTS AND DISCUSSIONS

Table (I) is obtained which illustrated the effect of Neem leaves powder in the treatment process. Figure 1) is drawn for more illustration

Four readings were obtained for different weights. The test result demonstrated that there was an increase from (1 – 4) hr in pH values until it reached 6.94, so that 4 hr was a suitable time to obtain a high value of pH in different weights. No salt settled in tank of treatment. Finally Neem seeds can be used in medicinal industries it is ecofriendly and proves to be the cheapest method of an acidic wastewater treatment. Neem leaves can be used in the explosive factories to treat acidic wastewater where no other facilities

Fig. 1. Variation of pH value with Neem weight

TABLE I
EFFECT OF NEEM IN THE TREATMENT PROCESS.

Weight (g)	pH after 1h	pH after 2h	pH after 3h	pH after 3h
5.0	6.45	6.64	6.83	6.85
7.50	6.58	6.88	6.58	6.94
10.0	6.80	6.85	6.90	6.92
12.50	6.84	6.88	6.90	6.94

are available for acidic wastewater treatment. The results obtained evidenced that the leaves of *Neem* were a great alternative for use as an acidic wastewater treatment systems. Figure (1) shown the variation of pH value with *Neem* weight.

III. CONCLUSION

Neem leaves powder acts as a natural alkaline product for the treatment of acidic wastewater. Thus it can be concluded that leaves powder of *Neem* was a reliable natural alkaline product.

ACKNOWLEDGMENT

This work was supported by **Karary University**.

REFERENCES

- [1] .Abdelmagid,I.M."Environmental Engineering"Khartoum Edition 1, 1999.pp23-102.
- [2] Bhide,N.K.,Mehta,D.J.,and ewis,R.A.,Attakar,W.W,(1958).Toxicity of sodium nimbidinate. Indian journal of medical Science 12:146-148.
- [3] Maree, J. P. and Hill, E (1989). Biological Removal of Sulphate From Industrial Effluents and Concomitant Production of Sulphur.Sulphur Reasearch. 29, pp. 713-740.
- [4] Pennington, T.D., (1981). Flora Neotropica. 1st Edn., New York botanical Garden, New York, Monograph, ISBN: 100893272353.
- [5] Tella, A., 1977. The effects of *Azadirachta indica* in acute Plasmodium berghei malaria. Nig. Med. J., 7: 258-263.
- [6] Siddiqui, S., S. Faizi, B.S. Siddiqui and Ghiasuddin, (1992). Constituents of *Azadirachta indica*: Isolation and structure elucidation of a new antibacterial, mahmoodin and a new protolimonoid, naheedn. J. Nat. Prod., 55: 303-310.
- [7] Biswas, K., I. Chattopadhyay, R.K. Banerjee and U. Bandyopadhyay, (2002). Biological activities and medicinal properties of *Neem* (*Azadirachta indica*). Curr. Sci., 82: 1336-1345.
- [8] Subapriya, R. and S. Nagini, (2005). Medicinal properties of *Neem* leaves: A review. Curr. Med. Chem. Anticancer Agents, 5: 149-156.
- [9] Roop, J.K., P.K. Dhaliwal and S.S. Guraya,(2005). Extracts of *Azadirachta indica* and *Melia azedarach* seeds inhibit folliculogenesis in albino rats. Braz. J. Med. Biol. Res., 38: 943-947.
- [10] Mahfuzul Hoque, M.D., M.L. Bari, Y. Inatsu, V.K. Juneja and S. Kawamoto, (2007). Antibacterial activity of guava (*Psidium guajava* L.) and *Neem* (*Azadirachta indica* A. Juss.) extracts against foodborne pathogens and spoilage bacteria. Foodborne Pathog Dis., 4: 481-488.
- [11] Prashant, G.M., G.N. Chandu, K.S. Murulikrishna and M.D. Shafiulla, (2007). The effect of mango and *Neem* extract on four organisms causing dental caries: *Streptococcus mutans*, *Streptococcus salivarius*, *Streptococcus mitis* and *Streptococcus sanguis*: An in vitro study. Indian J. Dent. Res., 18: 148-151.
- [12] Akhtar M., Hasany S. M., Bhanger M. I., and Iqbal S., (2006), Absorption Potential of *Moringa Oleifera* Pods for The Removal of Organic Pollutants From Aqueous Solutions, Journal of Hazardous Materials 141 (3), pp. 546-556.
- [13] Foidl N., Makkar H.P.S and Becker K., (2001). The potential of *Moringa oleifera* for agricultural and industrial uses. In, "The miracle Tree/The Multiple Attributes of *Moringa*" (Ed. Lowell J Fuglie). CTA. USA.
- [14] Jahn, S. A. A., (2001). Drinking water from Chinese river, challenges of clarification. J Water SRT Aqua, 50, pp. 15-27.
- [15] Khalid,H,Yousif,A,Babiker K,(2020) Bio-Treatment of an Acidic Industrial Wastewater, Tana Explosive Factory , Karary University, Chemical Engineering Dept., Sudan. SUST Journal of Engineering and Chemical Sciences (JECS), Vol. 21, No. 1, 2020.