

Physico-chemical Analysis of Water of Railway Colony Area Pond, Chakradharpur, Near Waste Accumulated Area

Debabrata Mahapatra & Sanjeev Kr. Sinha
 Deptt. Of Chemistry, J.R.U. Ranchi (Jharkhand) India.

ABSTRACT

Waste is a refuse of the daily house hold activities beside other activities. The huge accumulation of waste in unscientific way causes a lot of problems. It gives bad smell, provide breeding place for mosquitoes and germs. The leachate from the waste dump deteriorates the underground water quality too. In the present communication physico-chemical analysis of water of railway colony area pond, chakradharpur, near waste accumulated area has been analysed. The same is the part of Ph.D. work to access the impact of waste dump to water of Chaibasa and chakradhrpur of West singhbhum, Jharkhand.

Key words : MSW, physico-chemical analysis, Chakradharpur.

INTRODUCTION

Waste is defined as discarded or unwanted materials without any value having no economic or aesthetic role for mankind. It may include such materials which have been treated as "disposed off" materials left over from industrial as well as other activities including household activities contaminating the surrounding atmosphere like air, water and soil. Its deposition is sometimes hazardous for mankind and other living systems. Therefore, waste is a word that refers to describe any material that is discarded or not in use any longer and needs to be disposed. Due to modernization and technological development, the solid waste generation has not only been increased but it has also changed the environmental make up causing a number of problems to human population as well as to aquatic lives. There has been arisen the situation of chronic poisoning in some of the localities causing adverse effect on terrestrial life. It also affect the under ground water quality. For analyzing the water quality the Chakradharpur, railway colony was selected as because of heavy population load and accumulation of MSW. The sampling was done in all the three seasons namely rainy, winter and summer.

MATERIALS AND METHOD

The analysis of water sample was done in National

Metallurgical Laboratory, Jamshedpur during summer month and in other seasons the analysis was done with the help of field water testing kit. The complete analytical work shows this sample to be far better with reference to concentration of pollutants and other harmful chemicals and salts. During all the seasons, water was more or less clear showing lesser concentration of dissolved solids and other organic materials. There was no sign of objectionable smell too.

| PARAMETER | METHOD OF ANALYSIS |
|------------------------------|---|
| pH | : pH Meter / pH paper |
| Transparency | : Seechi Disc |
| Turbidity | : Turbidometer |
| Electrical Conductivity | : Conductivity meter / Conductometer |
| Dissolved Solids | : Conventional method |
| Total Hardness | : Conventional method |
| Sodium | : Ion Chromatograph / Water Testing Kit |
| Magnesium | : Ion Chromatograph / Water Testing Kit |
| Fluorine | : Ion Chromatograph / Water Testing Kit |
| Iron | : AAS / Water Testing Kit |
| Nitrate, Phosphate, Sulphate | : Water Testing Kit. |

Result and Discussion :

The complete analytical work can be shown in the following table and graphical representation.

TABLE I: ANALYSIS OF WATER SAMPLE OF RAIL. COLONY AREA

| Sl. No. | PARAMETER | SUMMER | RAINY | WINTER |
|---------|-------------------------|------------|--------------|------------|
| 1. | Colour | Colourless | Slight Muddy | Colourless |
| 2. | Odour | NIL | NIL | NIL |
| 3. | Transparency | Clear | Slight clear | Clear |
| 4. | Temperature | 41.2 | 26.4 | 11.5 |
| 5. | Turbidity | 5.2 | 1.2 | 3.4 |
| 6. | pH | 6.5 | 6.1 | 6.4 |
| 7. | Total Hardness | 100 | 94 | 112 |
| 8. | Electrical Conductivity | 427 | 455 | 420 |
| 9. | Dissolved Solids | 245 | 257 | 212 |
| 10. | Alkalinity | ND | 94 | 80 |
| 11. | Sodium | 43 | 28 | 44 |
| 12. | Magnesium | 13 | 8 | 15 |
| 13. | Nitrate | ND | 7.4 | 8.8 |
| 14. | Phosphate | ND | 0.01 | 0 |
| 15. | Sulphate | ND | 9.1 | 10.4 |
| 16. | Fluoride | 0.4 | 0.36 | 0.49 |
| 17. | Iron | 0.6 | 0.52 | 0.7 |

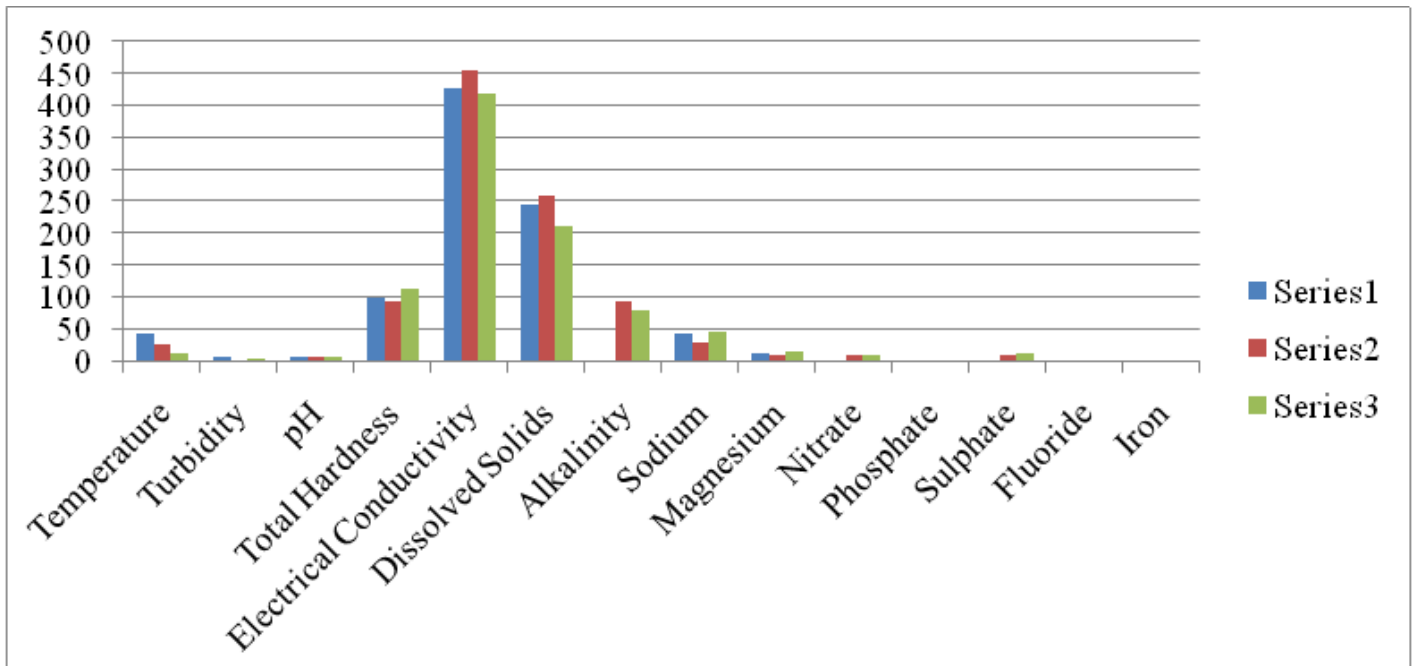
During analysis of turbidity, it was recorded 502 NTU during summer days, 1.2 NTU during rainy month and 3.4 NTU during winter. The pH value was totally up to mark showing no objectionable sign and it ranged from 6.1 to 6.5. Likewise, the estimation of total hardness showed it to be 100 mg/l during summer, 94 mg/l during rainy season and 112 mg/l in winter month.

The quantitative analysis of electrical conductivity shows that it was 427 $\mu\text{s}/\text{cm}$ in summer; 455 $\mu\text{s}/\text{cm}$ during rainy and 420 $\mu\text{s}/\text{cm}$ during winter season. The estimated value of dissolved solids also showed more or less within range which was estimated 245 mg/l in summer, 258 mg/l in rainy and 212 mg/l in winter season. The alkalinity was not detected during analytical work at NML during summer season but

during rainy season it was 94 mg/l and during winter, it was 80 mg/l.

The estimation of sodium salt showed its quantity to be 43 mg/l in summer, 28 mg/l in rainy and 44 mg/l in winter. Likewise, the concentration of magnesium salt was 13 mg/l during summer, 8 mg/l during rainy season and 15 mg/l during winter.

The analytical work of estimation of nitrate, phosphate and sulphate did not show their remarkable presence during summer months, but during rainy season the nitrate present was 7.4 mg/l; phosphate was 0.01 mg/l and sulphate was 9.1 mg/l. Likewise, during winter month, the concentration of nitrate was 8.8 mg/l; phosphate was nil and sulphate was 10.4 mg/l.



Series 1 = Summer Season; Series 2 = Rainy Season; Series 3 = Winter Season

Finally, the analytical data of Fluorine shows its concentration in this water sample to be 0.4 mg/l in summer; 0.36 mg/l in rainy and 0.49 mg/l in winter season. The analysis of iron was also done as per above mentioned procedure and it was found to be 0.6 mg/l in summer month; 0.52 mg/l during rainy and 0.7 mg/l during winter season. The concentration of iron present in the sample was above the safe zone and it authenticates the higher concentration of iron concentration in West Singhbhum area along with the state of Jharkhand.

References:

- Alam & Ahmad, 2013, "Impact of solid waste on health and environment". *Int. Jour. Of sustainable development and green Economics (IJSJDE)*, ISSN No.: 2315-4721, V-2, I-1, 2. 165-168.
- Asnani, P.U. 2006. *Solid Waste Management. India Infrastructure Report.*
- Bariar, S. A. 2007. *Municipal Solid Waste Management, (Case Study Ranchi), Ph.D. Thesis. Institute of Town Planners, New Delhi.*
- Bundela, P.S., Sharma, A., Pandey, A.K., Pandey, P. and Awasthi, A.K. 2012. "Physicochemical analysis of ground water near municipal solid waste dumping sites in Jabalpur". *International Journal of plant, Animal and Environmental Sciences*, 2(1): 217-222.
- Clean Jharkhand Project. 2003-2008. A community based Solid waste management in ULB's of Jharkhand, Project supported by ICEF, N. Delhi
- Chandrasekar M. 2002. Policy and Prospects on Municipal Solid Wastes. *Workshop on Municipal Solid Waste in India*, Delhi: IIT.
- Chattopadhyay, A.D. & Ray, S. 2009, "Municipal solid waste management in Kolkata, India – A review" *Waste Management*, vol. 29, no. 4, pp. 1449-1458.
- CPHEEO, 2005. *Ministry of Urban Development, Govt. Report of the Technology Advisory Group on Solid Waste Management.*
- Darshini, M. and Parasher A. 2005. NGO led partnership in solid waste management- Ranchi, School of Planning, CEPT University, Ahmedabad.
- Das R., Sinha, S., Prasad, A. and Mukherjee, P. 2007. Study on Quantity and Composition of Waste Generation in Ranchi Municipal area, Proceed. National Conference on Population Growth & Biodiversity Loss: A bio- social approach, Ranchi.
- Govt. of India 2000. *Manual on Municipal Solid Waste Management (CPHECO)*. Ministry of Urban Development. New Delhi.

- Hazra T., Goel S. 2009. "solid waste management in Kolkata, India: Practices and challenges." *Waste management* 29, 470-478.
- Misra V. & S.D.Pandey.2005., "Hazardous waste: Impact on health and environment for development of best waste management strategies in future in India". *Environment International*, 31(3), 417–431.
- Mukherjee, P.2015.Management of solid waste in Ranchi(Jharkhand): An approach through GO-NGO Collaboration Proc. XXXVIII Indian Social Science Congress, Andhra University Visakhapatnam(AP)
- Mukherjee, P., Kumar, A., Sinha, S. and Kisku, S. 2009.Quantity and composition of waste generated in Hazaribag Municipal area (Jharkhand): An analytical study.*J.Haematology & Ecotoxicol.*4(2).89-98.(2009).
- Mukherjee P and Kisku S. 2011. Solid waste : being treated as a resource b y various composting options at Ranchi. *J. Haematology & Ecotoxicol.*6(1).48-52.(2011).
- NEERI, 1994. Solid waste management in greater Bombay, Anaerobic digestion & reuse of digested products of selected components of urban solid waste.
- NEERI 1995. *Waste Analysis in Indian Cities. A Report.*
- National Environmental Engineering Research Institute (NEERI), 1996. "Background material for manual on solid management, Nagpur.
- NEERI 1995.. *Waste Analysis in Indian Cities. A Report.*
- Patel A. H. et. al. 1999 Report of the Committee constituted by The Hon Supreme Court of India on *Solid Waste Management of Class 1 cities of India.*
- Ramachandra, T. V. 2009. "Municipal Solid Waste Management." TERI Press, New Delhi.
- Ramachandra T.V., Varghese S.K., (2003) "Exploring possibilities of achieving sustainability in solid waste management." *Environmental Health*, 45 (4), 255-264.
- Sudhansu S.2006. Hospital waste management(A book on Principal and Practices) Published by Clean Jharkhand Project.
- Swarna Latha. P., Nageswara Rao, K., Jaganadha Rao, M. and Hari Krishna, M. (2009), 'Physico-chemical characterstics of ground water in Greater Visakhapatnam Municipal Corporation (GVMC)', Andhra Pradesh, *Indian Journal of Environmental Protection*, Vol. 29, No.5: 399-406.
- V. Gnaneshwar B.Vinod, 2012, *Innovative Solid Waste Management Practices in Bobbili Municipality*