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Dosing of proper oxidizing agents pretreatment to Kalatuwawa water to reduce the Trihalomethane (THM) formation in drinking water

Jayalal L P R Wijesinghe, Nishantha D P Welikala, K P R S Samarasinghe and **Ranjith C Perera**
National Water Supply and Drainage Board, Sri Lanka

Kalatuwawa water treatment plant consists of aeration, coagulation, flocculation, sedimentation, filtration and disinfection. Existing aeration is not enough to oxidize the inorganic and organic impurities in Kalatuwawa raw water, therefore prechlorine is used as oxidizing agent in Kalatuwawa. Analytical results revealed that during the years 2000–2012, the Kalatuwawa raw water contained high concentration of ammonia (0.578±0.469 mg/dm^3), and highest concentration of ammonia 1.92 mg/dm3 was reported at the bottom of the reservoir, high concentration of iron (0.751±0.643 mg/dm^3), and the highest concentration of iron 12 mg/dm^3 was reported at the bottom of the reservoir. The color levels were 11.571±7.271 Hz and the highest level of color, 90 Hz was reported at the bottom of the reservoir. Pre chlorination where chlorine is utilized not only oxidize the iron, manganese, ammonia and organic compounds but also reacts with naturally occurring organic matter present in water to produce a group of organic compounds as a byproduct arising from chlorination which was classified as Trihalomethane (THM). THMs are often used as indicator compounds for other DBPs. The four main THM compounds found in abundance are chloroform ($CHCl_3$), bromodichloromethane ($CHCl_2Br$), dibromochloromethane ($CHClBr_2$) and bromoform ($CHBr_3$). Many factors which will affect the THM formation are concentration and type of precursors, type of disinfectant and concentration and the dosing point, temperature, pH, contact time and the length of the distribution network. This study is basically investigating THM formation without prechlorination where potassium permanganate ($KMnO_4$) is used as pretreatment to remove the organic and inorganic impurities. Laboratory analysis was carried out using Jar test apparatus with potassium permanganate to remove the impurities. Analytical results revealed that 90% of iron was removed with 0.3-0.6 mgdm-3 dosage of potassium permanganate and the same time manganese level is within SLS 614: 2013. THM levels were monitored using GC–ECD couple to purge and trap system where the THM levels were reduced significantly (67%).

Biography

Jayalal L P R Wijesinghe graduated from University of Colombo, Sri Lanka with a BSc (Hons) degree. After graduation, he has joined the Department of Chemistry, University of Colombo as a Demonstrator then as a Researcher. He has obtained PG Diploma in the field of Toxicology and MSc degree in the field of Analytical Chemistry from the same university. He has started his water sector career as a Regional Chemist attached to the National Water Supply & Drainage Board in North Central Province of Sri Lanka. After successful completion of eight years of regional works, he was promoted to the Senior Chemist position in NWSDB. Presently he is working as a Chief Chemist in NWS&DB in Sri Lanka. He has gained 22 years of experience in the field of Water Quality Monitoring with the operation of high end analytical instruments – AAS with GTA, GC/MS, etc. He has published twelve research papers in local and international journals. He has undergone many training programs locally as well as internationally like – Lake Water Quality Management course in Japan, LC/MS training course at Waters in India, Analytical Skills Development Course in Helsinky University in Finland, etc. He is a Fellow Member of the Institute of Chemistry, Ceylon and also a Chartered Chemist.

lprjw@yahoo.com

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