MONITORING AND TREATMENT OF POLY SULFIDE AND ATRAZINE IN DRINKING WATER AND WASTE WATER

Submitted By

Mohammed Farouk Moustafa Khair El Sayed

B.Sc. of Science (Biochemistry-Chemistry), Faculty of Science, Helwan University, 2002

A thesis submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences

Department of Environmental Basic Sciences
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APPROVAL SHEET

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Abstract

Pesticides and polysulfide have negative impact on the human health and environment. Pesticides were classified as possible human carcinogens. World health organization (WHO) has set a limit for Atrazine (ATZ), Dimethoate (DMT), Propanil, Molinate, Isoproturon, Pendimethalin and Metolachlor in what? at concentrations (2ppb, 6ppb, 2ppb, 6ppb, 9ppb, 20ppb and 10ppbrespectively). This work aims at monitoringsome pesticides and Polysulfide in drinking and related raw water at Cairo and Kafr El Sheikh Governorates. Different treatment techniques for pesticides removal like Fenton reaction, chlorine oxidation, potassium permanganate oxidation and adsorption with granulated activated carbon (GAC) were carried out. The identification and quantification of pesticideswere explored using LC/MS/MS spectrometer and the analytical method was used (EPA 536.The identification and quantification of Polysulfide was explored using GC/MS/MS spectrometer andIodometric titration. The study recorded the presence of Atrazine, Dimethoate, Metolachlor, Pendimethalin, Propanil and Molinate during summer, spring and autumn (2014) in drinkingand related raw water of K. El Sheikh Governorate at concentrations (0.15ppb, 0.081ppb, 0.06ppb, 0.046ppb, 0.034ppb and0.038ppb, respectively) due to using them as herbicides in corn, rice, cotton and tomato crops. Also, the study reported the presence of Polysulfide in Cairo Governoratein concentration (11.4ppb) due to biological activity. Some trials were carried out to degrade and adsorb these pesticides using Fenton reaction, chlorine, potassium permanganate and GAC. Around 95% - 99 % of allPesticideswere removed after one hour by using Fenton oxidation;95% - 99%were removed after two hours by using (GAC). Chlorine had no effect in removing of Atrazine, Isoproturon, Propanil, Pendimethalin, Metolachlor but it was effective in removing of

Dimethoate and Molinate. Potassium permanganate had no effect in removing Atrazine, Molinate, Isoproturon, Propanil, Dimethoate, Pendimethalin, and Metolachlor. The kinetic calculations in thisstudy showed that all removal reactions were pseudo first order reaction and the suitable adsorption isotherm equation for all pesticides was Fruendlich equation with the following adsorption isotherm capacityPendimethalin > Propanil > Atrazine > Metolachlor > Molinate > Dimethoate > Isoproturon. Also field study showed that the Polysulfide concentration was decreased at acidic pH due to formation hydrogen sulfide and it is very stable at basic pH. Also it was decreased as the dissolved oxygen concentration increased due to the formation of sodium-thiosulfate and no significant effect was observed in polysulfide concentration with changing in temperature.

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