ABSTRACT

SALLA, M. R. **System of ozonation in effluent of anaerobic reactor: Study of the hydrodynamic and of oscillates answers of COD.** 2006. 446 p. Thesis (Doctoral) – Escola de Engenharia de São Carlos, Universidade de São Paulo, São Carlos, 2006.

This present work is a study about the oxidation problem of organic and inorganic matter in sanitary effluent by means of the ozonation, trying to improve the knowledge of dubious aspects considered in prior researches conducted in Department of Hydraulic and Sanitation of the EESC (Escola de Engenharia de São Carlos) at USP (Universidade de São Paulo) and also found in specific studies. The project, which has experimental objective, used a column of ozonation of square transversal section of 0.19m of side and 2.00m of height with two parallel faces of acrylic and two parallel faces of glass, where bubbles of ozone in ascension were provided by a microporous diffuser installed in the base of the column. A file of data about hydrodynamic characteristics of the bubbles in ascension (velocity in ascension, punctual percentage of the concentration, equivalent diameter and specific interface area) was stored, besides some physical and chemical parameters (waste ozone dissolved and gaseous, temperature, pH, alkalinity, conductivity, turbidity, real color, sulphet, COD, set of solids and set of carbon), important to the process of inorganic and organic matter oxidation by means of ozonation, changing the flow of the ozone from 50 to 300 L/h and the liquid level from 0.30 to 1.80m. It was noticed that the value of all hydrodynamic characteristics analysed increases when the flow of the ozone injected in the microporous diffuser also increases. It is important to mention that no-indisposition Laser velocimetry was used as an instrument to determine the bi-dimension velocity of the bubbles in ascension and to help determine the equivalent diameter, whereas the punctual percentage of the concentration of the bubbles was determined by means of counting Cesium-137 radiation. Analysis of chemical and physical parameters showed in a general and repetitive way that the reduction of the pH and alkalinity was not influenced by the dose of ozone used; the percentage of COD reduction had oscillated behaviour, being or not influenced by the dose of the ozone used. It also showed that conductivity had zero reduction and turbidity and real color here influenced by the dose of the ozone in terms of efficient reduction. The observation of the experiments permitted to infer that both physical and quality characteristics of the effluent influence the type of the behaviour of COD versus contact time. The behaviour expected by the solution of basic equations done to explain the inhibiting effect of intermediate compounds permitted to obtain increasing and decreasing evolutions in time, as well oscillated behaviour of the efficiency of COD reduction observed in this work. The experimental results of the velocities in ascension, the profile of the bubble concentration, equivalent diameter and specific interface area with chemical and physical parameters (waste ozone dissolved and gaseous, temperature, pH, alkalinity, conductivity, turbidity, real color, sulphet, COD, set of solids and set of carbon) organize a file of data to be used in simulations of the ozonation column which will elapse from this present work.
Specific equations here presented are worthy of further studies for the understanding of the dynamic present in the ozonation columns and the search of the optimization of its application.

Keywords: Ozonation. Oxidation. Hydrodynamic. Laser Velocimetry. Cesium-137 Radiation.