



TIME SERIES ANALYSIS OF THE HEAVY METALS LOADED WASTEWATERS RESULTED FROM CHROMIUM ELECTROPLATING PROCESS

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Abstract

This paper presents a time series analysis of the effluent pollution load resulted from the neutralization station of electroplating industry wastewaters originating from the chemical and electrochemical etching lines for the purpose of better understanding the appropriateness of selected linear modeling approaches. For this research were investigated pH, hexavalent chromium (Cr^{6+}), total chromium, total iron (Fe^{2+} ; Fe^{3+}), chemical oxygen demand (COD - potassium dichromate), nitrates (NO_3^-), and suspended solids (TSS), using time series recorded for one year. Multiple range tests were performed with Tukey HSD testing all pair wise comparisons among monthly means for each monitored parameter series. Time series analysis was applied to establish the general trend of concentration for each effluent parameter. The forecasting performance of the selected statistical models was evaluated and discussed. ARIMA models gave satisfactory results for hexavalent chromium, total iron, COD and TSS. As far as it concerns the pH, total chromium and nitrates, linear models including ARIMA did not perform well when using real data time series. Exploratory Factor Analysis has determined the main latent factor, which was related with suspended solids and nitrates, whose concentrations in the effluent often exceeded the standard limit value. Future work will consider the use of artificial neural networks, fuzzy logic and nonlinear models.

Key words: ARIMA model, electroplating industry effluent, hexavalent chromium, multivariate methods, time series analysis

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