



## A cast iron filings based model for dynamic investigation of corrosion and its compatibility with the real water distribution network

T. Laskowski<sup>a,\*</sup>, J. Świetlik<sup>a</sup>, U. Raczyk-Stanisławiak<sup>a</sup>, P. Piszora<sup>b</sup>, M. Sroka<sup>c</sup>,  
A. Olejnik<sup>c</sup>, J. Nawrocki<sup>a</sup>

<sup>a</sup>Faculty of Chemistry, Department of Water Treatment Technology, Adam Mickiewicz University, Umultowska St. 89b, 61-614 Poznań, Poland, Tel. +48 61 829 1582; emails: [tomasz.laskowski@amu.edu.pl](mailto:tomasz.laskowski@amu.edu.pl) (T. Laskowski), [askas@amu.edu.pl](mailto:askas@amu.edu.pl) (J. Świetlik), [stanisl@amu.edu.pl](mailto:stanisl@amu.edu.pl) (U. Raczyk-Stanisławiak), [jaceknaw@amu.edu.pl](mailto:jaceknaw@amu.edu.pl) (J. Nawrocki)

<sup>b</sup>Faculty of Chemistry, Department of Chemistry of Materials, Adam Mickiewicz University, Umultowska St. 89b, 61-614 Poznań, Poland, Tel. +48 61 829 1262; email: [pawel@amu.edu.pl](mailto:pawel@amu.edu.pl)

<sup>c</sup>Municipal Water Supply and Sewage Company in Warsaw, Pl. Starynkiewicza 5, 02-015 Warszawa, Poland, Tel. +48 22 445 5852; email: [M.Sroka@mpwik.com.pl](mailto:M.Sroka@mpwik.com.pl) (M. Sroka), Tel. +48 22 445 5850; email: [a.olejnik@mpwik.com.pl](mailto:a.olejnik@mpwik.com.pl) (A. Olejnik)

Received 14 July 2014; Accepted 15 February 2015

---

### ABSTRACT

A new model for the investigation of the impact of corrosion on water quality, based on application of cast iron filings, is proposed. The use of filings ensures a large specific surface area which permits observation of changes in water quality in a relatively small amount of material. Two models differing in idea and construction are presented in this paper. The detailed results from the one model where thin layer water flows over the cast iron filings are shown. The rate of water quality changes during stagnant periods could be controlled by different amounts of filings. The results received in the model experiment are compared with those from a real fragment (100 m) of distribution system. Deterioration of water quality observed in model conditions is similar to that in real distribution network. Increase of iron concentration, turbidity, and decrease of oxygen and nitrate concentration were observed in both systems during stagnation periods. No changes of water quality were observed during flow conditions. Elemental and phase composition of corrosion scales collected from both systems was also comparable.

*Keywords:* Corrosion; Cast iron; Drinking water; Dynamic model system; Distribution network

---

\*Corresponding author.