Electrochemical processes for the treatment of chlorinated ethanes in water solutions

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Chlorinated aliphatic hydrocarbons are frequently found in many surface and ground waters, as a result of their widespread use in industry and in various household products and their poor biodegradability [1]. Both destructive and non-destructive methods have been used to remove chlorinated aliphatic hydrocarbons. Destructive methods include aerobic/anaerobic degradation [2], chemical reaction via zero-valent iron [3], chemical and photochemical oxidation [4-5], electrochemical reduction [6-9] and oxidation [10,11]. In the present work, the electrochemical treatment of water solutions containing chloro ethanes was performed by cathodic reduction, anodic oxidation and coupled processes with the aim of evaluate the effectiveness of these methodologies.

[1] Chlorinated Hydrocarbons, in Ullmann's Encyclopedia of Industrial Chemistry, Wiley-VCH Verlag GmbH & Co. KGaAed. (2002), electronic edition.
[2] G. Stucki, M. Thuer, R. Bentz, Wat. Res., 26 (1992) 273; S. Keunning, D. Jannsen, B. Withold, J. Biotechnol., 163 (1985), 635.
[3] V. Janda, P. Vasek, j. Bisova, M. Reinhard, Cremosphere, 54 (2000) 917.
[4] R. Gurtler, U. Moller, S. Sommer, H. Muller, K. Kleinermanns, Cremosphere, 29 (1994), 1671
[5] L. Prager, E. Hartmaqnn, J. Photochem. Photobiol., 138 (2001) 177.
[6] S. Rondinini, A. Vertova, Electrochim. Acta, 49 (2004) 4035.
[7] G. fiori, S. Rondinini, G. Sello, A. Vertova, M. Cirja, L. Conti, J. Appl. Electrochem., 35 (2005) 363.
[8] N. Sonoyama, T. Sakata, Environ. Sci. Technol., 33 (1999) 3438.
[9] N. Sonoyama, K. Ezaki, T. Sakata, Advan. Environ. Res., 6 (2001) 1.
[10] G. Chen, E. A. Betterton, R. G. Arnold, J. Appl. Electrochem., 29 (1999) 961.
[11] R. Bejankiwar, J. A. Lalman, E. Seth, N. Biswas, Water Research, 39 (2005) 4715.trochim. Acta 44 (1999) 2483.
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