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Evaluation of Filter Material for Treatment of Different Types of Wastewater

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ABSTRACT

This paper presents an evaluation of the suitability of a mixed absorbent based on peat and carbon-containing ash for treatment of wastewaters, such as wastewater from professional car washes, landfill leachate and stormwater. This mixture is very attractive, since it is a low-cost material which has a capability to simultaneously remove inorganic as well as organic pollutants. Since any filter material eventually needs to be replaced either due to saturation of pollutants or reduced infiltration capacity, it is important that the residual can be handled at low cost and that the environment will be not impaired. The tested mixture, used in filter beds, showed low leaching values and high simultaneous removal efficiency of metals as Cu, Cd and Pb, non-polar organic compounds such as PCBs. Polar organic compounds as phenols were also efficiently removed by microbial and/or chemical degradation in the studied treatment plants with the filter bed acted as a biofilter. Filter material used for three years in a full-scale plant for leachate treatment and four years in treatment plants for wastewater from car washes, had sufficiently high energy content indicating that energy recovery is a good alternative for handling after its usage. Results show that the presented filter material is excellent for both small scale applications (e.g. treatment systems for car wash wastewater with capacity between 250 - 3000 m³ per year) as well as large-scale applications (e.g. filter systems for landfill leachates with capacity above 30,000 m³ per year).

KEYWORDS

Wastewater Treatment, Industrial Landfill, Car Wash, Batch Test, Leaching Test, Peat, Carbon-Containing Ash

Cite this paper

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References

- [1] P. Kjeldsen, et al., " Present and Long-Term Composition of MSW Landfill Leachate: A Review," *Critical Reviews in Environmental Science and Technology*, Vol. 32, No. 4, 2002, pp. 297-336.
- [2] C. ?man, et al., " Development of Methods for Characterisation of Landfill Leachates—Final Report," IVL Swedish Environmental Research Institute Ltd., Stockholm, Vol. B-1353, 2000.
- [3] C. B. ?man and C. Junestedt, " Chemical Characterization of Landfill Leachates—400 Parameters and Compounds," *Waste Management*, Vol. 28, No. 10, 2008, pp. 1876-1891.
- [4] Swedish EPA, " Leachate from Landfills," Swedish Environmental Protection Agency: Naturv?rdsverket, Stockholm, Sweden, Vol. 8306, 2008.
- [5] J. M. Lema, et al., " Characteristics of Landfill Leachate and Alternatives for Their Treatment: A Review," *Water Air and Soil Pollution*, Vol. 40, 1988, pp. 223-250.
- [6] Swedish EPA, " Fordonstv?ttar. Utg?va 1" , 2005. <http://www.naturvardsverket.se/Documents/publikationer/620-8207-8.pdf>
- [7] P. K?ngsepp, et al., " Column Studies Aiming at Identification of Suitable Filter Materials for Pollutant Removal

from Landfill Leachate," *International Journal of Environment and Waste Management*, Vol. 2, No. 6, 2008, pp. 506-525. doi:10.1504/IJEW.2008.021856

- [8] L. Mårtensson, et al., "Development and Application of an Analytical Protocol for Evaluation of Treatment Processes for Landfill Leachates. II. Evaluation of Leachate Treatment Efficiency of Different Steps in a Constructed Pilot Plant," *International Journal of Environmental Analytical Chemistry*, Vol. 87, No. 1, 2007, pp. 17-27. doi:10.1080/03067310600929233
- [9] P. Kungsepp, et al., "Filter-Based Treatment of Leachate from an Industrial Landfill Containing Shredder Residues of End-Of-Life Vehicles and White Goods," *Waste Management*, Vol. 30, No. 2, 2010, pp. 236-245. doi:10.1016/j.wasman.2009.08.005
- [10] P. Kungsepp and L. Mathiasson, "Performance of a Full-Scale Biofilter with Peat and Ash as a Medium for Treating Industrial Landfill Leachate: A 3-Year Study of Pollutant Removal Efficiency," *Waste Management & Research*, Vol. 27, No. 2, 2009, pp. 147-158. doi:10.1177/0734242X08095232
- [11] D. Rosenqvist, Laqua Treatment AB, 2011. http://www.laqua.se/index_en.php
- [12] D. Rosenqvist, Laqua Wash, 2011. http://www.laqua.se/index_en.php?m=fs_fordonstvatt&p
- [13] Swedish Standard Institute, "Characterisation of Waste— Leaching—Compliance Test for Leaching of Granular Waste Materials and Sludges—Part 4" , SS-EN 12457-4, 2003.
- [14] Council Decision of 19 December 2002, Establishing Criteria and Procedures for the Acceptance of Waste at Landfills Pursuant to Article 16 of and Annex II to Directive 1999/31/EC, 2003/33/EC.
- [15] G. Tyler and T. Olsson, "Conditions Related to Solubility of Rare and Minor Elements in Forest Soils," *Journal of Plant Nutrition and Soil Science*, Vol. 165, 2002, pp. 594-601.
- [16] Swedish EPA, "Naturvårdsverkets föreskrifter om deponering, kriterier och förfaranden för mottagning av avfall vid anläggningar för deponering av avfall," *Swedish Environmental Protection Agency*, Vol. NFS 2004:10, 2004.
- [17] SGU, "Torv - kemisk sammansättning," 2011. <http://www.sgu.se/sgu/sv/samhalle/energi-klimat/torv/torv-kemi.html>
- [18] Bioenergiportalen, "Exempel på bränsledata för olika bränslen" , 2011. <http://www.bioenergiportalen.se/?p=1590>
- [19] Swedish Water, "Publication P95, Råd vid mottagande av avloppsvatten från industri och annan verksamhet," *The Swedish Water & Wastewater Association, SWWA*, 2009.
- [20] National Food Administration, "Livsmedelsverkets förrdning (2001:30) om dricksvatten" , *Livsmedelsverket*, Vol. SLVFS 2001:30, 2001.
- [21] Kristianstad Municipality, "Policy för krav på rening av avloppsvatten från fordonstvättar," 2005. http://www.kristianstad.se/upload/Malgrupper/Foretag/dokument/lagar_vagledning/miljoskydd/Policybiltvatt.pdf
- [22] Y. Kalmykova, et al., "Adsorption of Cd, Cu, Ni, Pb and Zn on Sphagnum Peat from Solutions with Low Metal Concentrations," *Journal of Hazardous Materials*, Vol. 152, No. 2, 2008, pp. 885-891. doi:10.1016/j.jhazmat.2007.07.062
- [23] P. A. Brown, et al., "Metal Removal from Wastewater Using Peat," *Water Research*, Vol. 34, No. 16, 2000, pp. 3907-3916. doi:10.1016/S0043-1354(00)00152-4
- [24] D. Rosenqvist, Laqua Treatment AB, 2011. (personal communication 2011-05-06)
- [25] P. Kungsepp, et al., "Hydraulic Performance of a Full-Scale Peat and Ash Biofilter in Treatment of Industrial Landfill Leachate," *Waste Management & Research*, Vol. 27, No. 5, 2009, pp. 512-519. doi:10.1177/0734242X08096138
- [26] Swedish Standard Institute, "Characterisation of Waste— Leaching Behaviour Tests—Up-Flow Percolation Test," SS-EN 14405:2004, 2004.
- [27] J. Burvall and M. Thman, "Co-Combustion of Peat and Biofuels," (Samförbränning av torv och biobränslen - askrelaterade systemfördelar), *Statens energimyndighet, Sweden*, 2006.

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