

Simultaneous removal of As, Cd, Cr, Cu, Ni and Zn from stormwater using high-efficiency industrial sorbents: Effect of pH, contact time and humic acid - DTU Orbit (09/11/2017)

Simultaneous removal of As, Cd, Cr, Cu, Ni and Zn from stormwater using high-efficiency industrial sorbents: Effect of pH, contact time and humic acid

The effect of contact time, solution pH, and the presence of humic acid (HA) on the combined removal of As, Cd, Cr, Cu, Ni and Zn is investigated in batch tests using alumina, granulated activated carbon (GAC), and bauxsol coated sand (BCS) as sorbents. It is found that the equilibrium time for Cd, Cu, Ni and Zn is about 4 h, while no clear equilibrium is observed for As and Cr. It is also found that increasing the pH until pH \sim 8 enhanced Cd, Cu, Ni and Zn removal, but increasing the pH above this point had no major effect. In the cases of As and Cr, higher pH values (i.e. $>$. 7) decreased their removal. The presence of both 20 and 100 mg/L HA suppressed the heavy metal removal except for Cr, and the suppression was higher at the higher HA concentration. Geochemical simulations suggest that this is due to the formation of dissolved HA-metal complexes preventing effective metal sorption. In the case of Cr, the presence of HA increased the removal when using alumina or BCS, while hindering the removal when using GAC. The findings show that the pH-value of the stormwater to be treated must be in the range of 6-7 in order to achieve removal of the full spectrum of metals. The results also show that natural organic matter may severely influence the removal efficiency, such that, for most metals the removal was reduced to the half, while for Cr it was increased to the double for alumina and BCS. Consequently, a properly working filter set up may not work properly anymore when receiving high loads of natural organic acids during the pollen season in spring or during defoliation in autumn and early winter, and during mixing of runoff with snowmelt having a low pH.

General information

State: Published

Organisations: Department of Environmental Engineering, Urban Water Systems

Authors: Genc-Fuhrman, H. (Intern), Mikkelsen, P. S. (Intern), Ledin, A. (Intern)

Number of pages: 10

Pages: 76-85

Publication date: 2016

Main Research Area: Technical/natural sciences

Publication information

Journal: Science of the Total Environment

Volume: 566-567

ISSN (Print): 0048-9697

Ratings:

BFI (2017): BFI-level 2

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 5.09 SJR 1.621 SNIP 1.849

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): SJR 1.674 SNIP 1.642 CiteScore 4.33

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): SJR 1.635 SNIP 1.847 CiteScore 4.2

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 2

Scopus rating (2013): SJR 1.527 SNIP 1.759 CiteScore 3.73

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): SJR 1.773 SNIP 1.811 CiteScore 3.7

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 1.798 SNIP 1.681 CiteScore 3.61

ISI indexed (2011): ISI indexed yes

Web of Science (2011): Indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 1.644 SNIP 1.513

Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.571 SNIP 1.602
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.463 SNIP 1.501
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.407 SNIP 1.491
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.515 SNIP 1.605
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.442 SNIP 1.508
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.123 SNIP 1.305
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.164 SNIP 1.369
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.168 SNIP 1.352
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.063 SNIP 1.081
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.98 SNIP 1.071
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.925 SNIP 0.937

Original language: English

Environmental Chemistry, Pollution, Waste Management and Disposal, Environmental Engineering, Filter, Heavy metal, Humic acid, Sorption, Stormwater, Treatment, Activated alumina, Activated carbon, Alumina, Biological materials, Carbon , Efficiency, Heavy metals, Metal complexes, Metals, Nickel, Organic acids, pH, Storms, Zinc, Geochemical simulation, Granulated activated carbons, Natural organic matters, Simultaneous removal, Stormwaters, pH effects

DOIs:

10.1016/j.scitotenv.2016.04.210

Source: FindIt

Source-ID: 2304611766

Publication: Research - peer-review › Journal article – Annual report year: 2016