Influences of ammonia contamination on leaching from air-pollution-control residues

Application of selective non-catalytic reduction systems at municipal solid waste incinerators (MSWIs) often involves over-stoichiometric injection of ammonia into flue gases. Un-reacted ammonia may be deposited on fly ash particles and can ultimately influence the leaching behaviour of air-pollution-control (APC) residues. Batch tests were conducted to investigate the impacts of ammonia levels on leaching of a range of metals (sodium, potassium, calcium, aluminium, chromium, iron, lead, cadmium, copper, nickel and zinc), as well as chloride and dissolved organic carbon (DOC). Specific conductivity was also identified to reflect the soluble components. The results showed that with ammonia concentrations rising from a background level of 4 to 26,400 mg l\(^{-1}\), the specific conductivity increased by 2-7 times as pH varied from alkaline to acidic values. DOC release was also significantly enhanced with high ammonia levels of 1400 mg l\(^{-1}\) or higher at pH > 9; however at these high ammonia concentrations, the role of DOC in cadmium, copper, nickel and zinc leaching was negligible. Based on the experimental data, chloride, sodium and potassium were leached at high concentrations regardless of pH and ammonia concentrations. For aluminium, chromium, iron and lead, ammonia had little impact on their leaching behaviour. With respect to cadmium, copper, nickel and zinc, high ammonia concentrations significantly increased leaching in the pH range of 8-12 due to the formation of metal-ammonia complexes, which was also proved in the speciation calculations. However, the overall results suggest that typical levels of ammonia injection in MSWIs are not likely to affect metal leaching from APC residues.
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.33 SJR 1.028 SNIP 0.858
Web of Science (2011): Impact factor 1.193
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.662 SNIP 0.957
Web of Science (2010): Impact factor 1.222
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.869 SNIP 1.251
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.537 SNIP 0.967
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.359 SNIP 0.697
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.317 SNIP 0.759
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.501 SNIP 0.72
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.478 SNIP 0.828
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.613 SNIP 0.822
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.44 SNIP 0.675
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.678 SNIP 1.163
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.517 SNIP 0.897
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.56 SNIP 0.817
Original language: English
DOIs:
10.1177/0734242X14545641
Source: FindIt
Source-ID: 270307014
Research output: Research - peer-review › Journal article – Annual report year: 2014