Mercury emissions from cement plants are being regulated by environmental agencies in most countries. Both dynamic mercury emissions in cement kiln systems and removal of mercury by sorbent injection require continuous mercury emission monitoring. Dry converters for total mercury measurements are still under development and are investigated in this work. A commercial red brass converter was tested at 180°C and it was found that the red brass chips work in nitrogen atmosphere only, but do not work properly under simulated cement kiln flue gas conditions. Test of the red brass converter using only elemental mercury shows that when HCl is present with either SO2 or NOx the mercury measurement after the converter is unstable and lower than the elemental mercury inlet level. The conclusion is that red brass chips cannot fully reduce oxidized mercury to elemental mercury when simulated cement kiln gas is applied. A sodium sulfite-based converter material was prepared by dry impregnation of sodium sulfite and calcium sulfate powders on zeolite pellets using water glass as binder. The sulfite converter works well at 500°C with less than 10ppmv HCl in the simulated cement kiln flue gas. The 95% response time of the sulfite converter is short and typically within 2min. Dynamic mercury adsorption and oxidation tests on commercial activated carbons Darco Hg and HOK standard were performed at 150°C using simulated cement kiln gas and a fixed bed reactor system. It is shown that the converter and analyzer system is capable of following the transient mercury outlet concentration in a satisfactory way. Suggestions for practical applications of the sulfite converter in both lab and cement plants are presented.
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 4.1 SJR 2.041 SNIP 2.423
Web of Science (2011): Impact factor 3.248
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.957 SNIP 2.298
Web of Science (2010): Impact factor 3.604
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.985 SNIP 2.27
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.613 SNIP 2.156
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.364 SNIP 1.86
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.229 SNIP 1.64
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.596 SNIP 1.73
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.203 SNIP 1.864
Scopus rating (2003): SJR 1.068 SNIP 1.446
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.065 SNIP 1.284
Scopus rating (2001): SJR 1.062 SNIP 1.269
Scopus rating (2000): SJR 1.161 SNIP 1.295
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.086 SNIP 1.141
Original language: English
Keywords: Continuous mercury monitor, Oxidized mercury converter, Activated carbon, Cement kiln flue gas, Mercury adsorption and oxidation
DOIs: 10.1016/j.fuel.2011.09.053
Source: orbit
Source-ID: 317404
Research output: Research - peer-review › Journal article – Annual report year: 2012