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TECHNICAL BULLETIN

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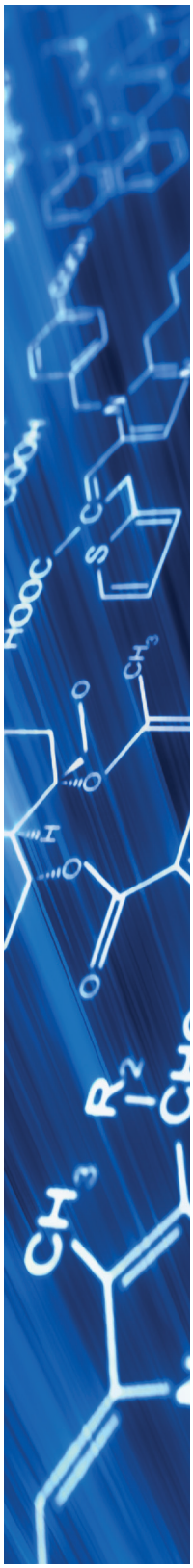

Cost-Effective Recovery of Metals from Incinerator Ash

In 2010, 86 waste-to-energy (WtE) facilities operating in 24 states processed more than 26 million tons of municipal solid waste. The two types of ash produced during WtE generation – bottom ash and fly ash – are frequently combined to reduce the leaching potential of the component metals. There have been numerous investigations into the possibility of using WtE ash as a source of metals, including copper, lead, mercury and rare earth metals. However, a cost-effective method of extraction and isolation has not been previously reported.

Periodic Products Inc.'s patented Chelok® technology is a polymer-based chelating compound possessing multiple industrial applications. Applying our proprietary extraction technology and patented polymer-based metal isolation procedures, we have successfully isolated copper and lead – the primary metal contaminants – from 80-year-old municipal incinerator ash. Based on initial projections, the cost of extraction and isolation (including CAPX) is approximately 50% of the current market price for these metals, making this process economically viable.

Element	Symbol	mg Metal / g Material (Max)	mg Metal / g Material (1st Wash)	mg Metal / g Material (2nd Wash)	mg Metal g Material (Total)	% Extraction	% Binding	% Recovery
Copper	Cu	0.0265	0.0192	0.0038	0.0230	87%	99%	86%
Lead	Pb	0.1110	0.0919	0.0143	0.1062	96%	100%	96%

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