A Novel Remediation Approach for POPs Contaminated Solids Using Carbonaceous Materials

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Persistent Organic Pollutants (POPs) are toxic, persistent, bioaccumulative and prone to long-range transport. In the environmental sectors, solids including soil and sediment are recognized as the ultimate ‘sink’ for accumulating POPs. In order to combat the threat posed by POPs to human health and the environment, research and development of technologies for removal of POPs from solids have gained considerable importance. A thermal desorption technology in which POPs contaminated solids are being remediated by desorption and degradation is increasingly used because of their high reliability and efficiency. However, high energy consumption and required cost for treatment of the effluent gas and generated secondary waste have prevented its widespread implementation.

In this study, a novel remediation process based on sintering process is proposed using cost effective recycled carbonaceous materials as both an adsorbent and thermal source. And successive batch mode processes are conducted to prevent producing secondary wastes and reduce the treatment cost. As a result, POPs could be effectively removed from the contaminated solids, the removal rate was reached higher than 90% of the total amount. Contaminants in the effluent gas were satisfied with the emission limits of USEPA. Furthermore, the degradation pathways and mechanisms of POPs were deduced using isotope labelling method. It is envisaged that this proposed novel approach can be set up as an alternative to the conventional methods for remediation of POPs contaminated solids in the standpoint of its performance and cost-effectiveness.

References