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Using natural organic matter as a remediation material in environmental applications

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Natural organic matter (NOM) is being characterised and investigated for use as a remediation material in various applications.

Two readily available environmental materials are being tested:

Material A: 68% by weight of the material is organic including 19% humic acid, 28% fulvic acid and 21% humin. 32% of the material is inorganic, containing 23% iron.

Material B: 57% by weight of the material is inorganic, 3% is humic acid, 27% is fulvic acid and 13% is humin. The humin fraction of these two materials may contain humic acid that has been immobilised by clays or other minerals.

The materials have been tested in three applications;

i) As a permeable reactive barrier

A permeable reactive barrier is a passive, in situ method that is used to remediate contaminated groundwater. As groundwater flows through it, the barrier extracts contaminants, significantly reducing their concentration. Both materials are capable of extracting metals and organic pollutants from groundwater ii) Extraction of iodine from urine

¹³¹I may be given to patients with thyroid problems for diagnosis or treatment. About 30% of the activity (2-3 GBq) is excreted in urine during the first day after administration. In some parts of Europe, the radioactive urine is collected in tanks at the hospital. The objective of this investigation is to determine whether the radioiodine can be extracted from urine and concentrated in a smaller volume of solid. iii) Extraction of iron and other contaminants from industrial effluents

During the production of kaolinite or China Clay, brown discoloration caused by Fe³⁺-containing impurities is removed by the addition of acid and a reducing agent, forming soluble Fe²⁺. The latter is then removed from the effluent by precipitation with NaOH and flocculants. This study investigates the use of solid NOM to bind iron and co-contaminants directly, avoiding the need for alkali addition and precipitation of large quantities of slurry.

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