University of Essex

IP PRAGMATICS

Bioremediation of Oil Sands Process Water

The extraction of oil from oil sands results in the production of vast quantities of oil sands process waters (OSPW) which are contaminated with toxic naphthenic acids. Currently this wastewater is contained in tailings ponds and left for the mature fine tailings (MFT) to settle out and the naphthenic acids to degrade, which can take years or decades. Scientists at the University of Essex have developed a novel bioremediation method which speeds up this process by increasing the sedimentation of particulates from the water.

Technology:

The technique involves the use of a consortium of micro-organisms which are capable of metabolizing naphthenic acids, and growing them in a bioreactor with the oil sands process water (OSPW).

Duplicate 'live' bioreactors were seeded with 10 L of our microbial consortium and 180 L of OSPW. Duplicate control bioreactors without our microbial consortium and only OSPW were also set up.

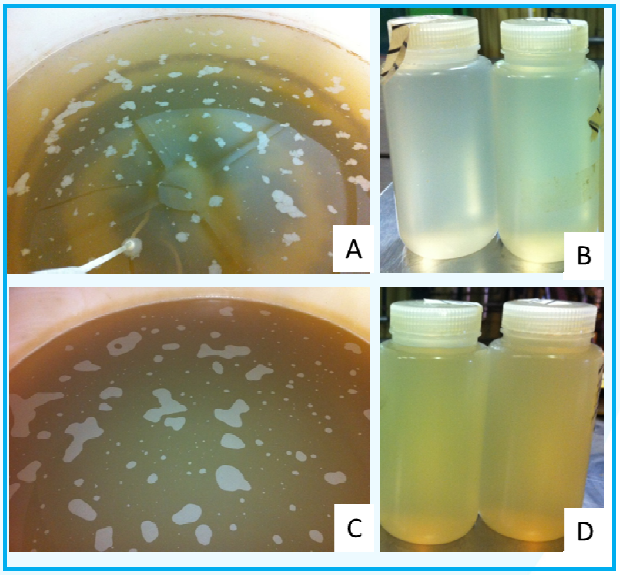

Fig 1 Bioreactor treatment of OSPW:
(A) top down view of one of the 'live' bioreactors at day 28;
(B) clear water samples from 'live' bioreactors at day 28;
(C) top down view of one of the control bioreactors at day 28;
(D) turbid water samples from control bioreactors at day 28

After only 28 days of treatment, it was visibly obvious that the 'live' bioreactors (Figs 1A & 1B) containing our microbial consortium had significantly less suspended solids compared to the controls (Figs 1C & 1D). There was also a marked decrease in toxicity (by > 50 %) in the bioreactors by day 28, as measured by Microtox®.

Benefits

- Greatly increases sedimentation rates of solids in OSPW (approx. one month, rather than decades)
- Greatly reduces OSPW toxicity
- Works at room temperature and pressure
- Can be used to treat existing tailings pond water, or newly produced OSPW
- Low capital and running costs
- Can be readily mobilized on site

Patent:

Patent application submitted in 2015. Further information is available under confidentiality.

Status:

The technique has already been demonstrated successfully to treat 300 L of OSPW from a single site in Canada. The next stage is to validate the general applicability of the technique with a variety of different OSPW inputs, and to understand how it could be best integrated with current practice.

The University is seeking commercial partners which would be willing to collaborate through the provision of funding and/or access to OSPW waste streams.

Research Collaboration Opportunity

For further information on this technology, please contact:

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