Uranium fixation by Cladophora spec.

Dienemann, C., Dienemann, H., Dudel, E.G., Schurig, C.

TU Dresden, Institut für Allgemeine Ökologie und Umweltschitz, Pienner Straße 8, 01737, Tharandt, Germany, E-mail: claudia.dienemann@web.de

Downstream of various Saxon Uranium-mining-sites (Johanngeorgenstadt, Helmsdorf, Neuensalz, Schneckenstein) filamentous algae (especially *Cladophora spec., Ulothrix spec*.) that had formed dense mats were frequently found in water-bodies.

Obviously, these species are well adapted to the chemical conditions of dump and tailing waters (e.g. neutral-alkaline milieu, uranium contents several $\mu g*l^{-1}$ to several $mg*l^{-1}$). Uranium concentrations in algae from these waters vary between 20 and 400 $\mu g*g^{-1}$ (DM) (Dienemann et al. 2002, Kalin et al. 2005, Vogel et al. 2004).

Technical use of filamentous algae for eliminating uranium – e.g. in throughput flow reactors – is almost impossible because of the development of mats. that affect diffusion and may clog the reactor. Unlike *Cladophora fracta* and *Cladophora glomerata Cladophora aegagropila* forms balls instead of mats, so the working hypothesis was that *Cladophora aegagropila* may be successfully used in a throughput flow reactors eliminating more uranium from the water than filamentous Cladophorae and without clogging the reactor.

Batch experiments were carried out with filamentous algae to prove this assumption. Uranium solutions were adjusted to pH=7.5 by Na_2CO_3 (Merck p.a.).

Plexi-glass columns were filled with *Cladophora aegagropila*-balls, pore volume and exposure time were analysed via tracer (bromide) and uranium concentrations were measured by ICP-MS (PQ2+, TJA).

The experiment went for 36 hours, no hydrological impacts happened to the test arrangement. At the end of the experiment, *Cladophora aegagropila* contained 782 $\mu gU*g^{-1}$ (DM) (at a water concentration of app. 1700 $\mu gU*l^{-1}$). Extrapolation shows a maximum capacity of Uranium elimination of 1500 to 2000 $\mu g*g^{-1}$ (DM) after app. 100-120 hrs. Elimination results in the batch experiments with filamentous algae were significantly lower (app. 360 $\mu gU*g^{-1}$ (DM) at 2700 $\mu gU*l^{-1}$).

Literature

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