



## Des détoxifiants de la décharge

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Catégories: Eaux usées | Polluants | Société

**Des bactéries provenant d'une décharge indienne pourraient contribuer à éliminer la contamination chimique. L'accent est mis sur les pesticides tels que le lindane ou les agents ignifuges bromés, qui s'accumulent dans la nature et dans les chaînes alimentaires. Les chercheurs de l'Eawag et de l'Empa ont utilisé des bactéries pour produire des enzymes capables de décomposer ces produits chimiques.**

Pouvons-nous récupérer ou rendre inoffensifs les déchets chimiques des générations passées? Le microbiologiste Hans Peter Kohler de l'institut de recherche de l'eau Eawag et le chimiste de l'Empa Norbert Heeb, ainsi que des chercheurs de l'Université des sciences appliquées de Zurich (ZHAW) et de deux instituts indiens, ont mis la question à l'épreuve.

Retrouvez l'article exhaustif sur ce sujet sur le site de l'Empa: [Des détoxifiants de la décharge](#)

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### Coopérations

Empa Université des sciences appliquées de Zurich (ZHAW)

### Publication originale

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Snowflake\Publications\Domain\Model\Publicationprototypepersistent entity (uid=22027, pid=124) originalId => protected22027 (integer) authors => protected'Heeb,&nbsp;N.&nbsp;V.; Hubeli,&nbsp;J.; Fleischmann,&nbsp;T.; Lienemann,&nbsp;

p;P.; Nayyar,&nbsp;N.; Lal,&nbsp;R.; Kohler,&nbsp;H.&nbsp;P.&nbsp;E.' (144 chars) title => protected'Transformation of  $\gamma$ -HBCD with the *Sphingobium Indicum* enzymes LinA

1, LinA2 and LinATM, a triple mutant of LinA2' (121 chars) journal => protected'Chemosphere' (11 chars) year => protected2021 (integer) volume => protected267 (integer) issue => protected" (0 chars) startpage => protected'129217 (12 pp.)' (15 chars) otherpage => protected" (0 chars) categories => protected" (0 chars) description => protected'Hexabromocyclododecanes (HBCDs) were used as flame-retardants until their ban in 2013. Among the 16 stereoisomers known,  $\gamma$ -HBCD has the highest symmetry. This makes  $\gamma$ -HBCD an interesting substrate to study the selectivity of biotransformations. We expressed three LinA dehydrohalogenase enzymes in *E. coli* bacteria, two wild-type, originating from *Sphingobium indicum* B90A bacteria and LinATM, a triple mutant of LinA2, with mutations of L96C, F113Y and T133 M. These enzymes are involved in the hexachlorocyclohexane (HCH) metabolism, specifically of the insecticide  $\gamma$ -HCH (Lindane). We studied the reactivity of those eight HBCD stereoisomers found in technical HBCD. Furthermore, we compared kinetics and selectivity of these LinA variants with respect to  $\gamma$ -HBCD. LC-MS data indicate that all enzymes converted  $\gamma$ -HBCD to pentabromocyclododecanes (PBCDens). Transformations followed Michaelis-Menten kinetics. Rate constants  $k_{cat}$  and enzyme specificities  $k_{cat}/K_M$  indicate that  $\gamma$ -HBCD conversion was fastest and most specific with LinA2. Only one PBCD enantiomer was formed by LinA2, while LinA1 and LinATM produced mixtures of two PBCD enantiomers at

assume that 1E,5S,6R,9S,10R-PBCD en is the  $\gamma$ -HBCD transformation product from LinA2. Implementing three amino acids of the LinA1 substrate-binding site into LinA2 resulted in a triple mutant with similar kinetics and product specificity like LinA1. Thus, point-directed mutagenesis is an interesting tool to modify the substrate- and product-specificity of LinA enzymes and enlarge their scope to metabolize other halogenated persistent organic pollutants regulated under the Stockholm Convention.' (1866 chars) serialnumber => protected'0045-6535' (9 chars) doi => protected'10.1016/j.chemosphere.2020.129217' (33 chars) uid => protected22027 (integer) \_localizedUid => protected22027 (integer) modified \_languageUid => protectedNULL \_versionedUid => protected22027 (integer) modified pid => protected124 (integer) Heeb, N. V.; Hubeli, J.; Fleischmann, T.; Lienemann, P.; Nayyar, N.; Lal, R.; Kohler, H. P. E. (2021) Transformation of  $\gamma$ -HBCD with the *Sphingobium Indicum* enzymes LinA1, LinA2 and LinATM, a triple mutant of LinA2, *Chemosphere*, 267, 129217 (12 pp.), doi:10.1016/j.chemosphere.2020.129217, Institutional Repository

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