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# 沉积物中重金属铜的解吸动力学模拟

## Modeling and simulation of desorption kinetics of Cu in sediments

中文关键词:沉积物 铜 解吸 DGT DIFS

Key words:Sediment Cu Desorption DGT DIFS

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| 作者 | 单位 | E-mail |
| --- | --- | --- |
| 范英宏 | 北京交通大学 | fyh_bj@163.COM |
| 赵国堂 | 北京交通大学 | |
| 高亮 | 北京交通大学 | |

中文摘要:

　　采用DIFS模型模拟了DGT在沉积物中放置过程中，吸附态Cu从固相解吸的动力学过程。结果表明，对于模拟的三个样品，R值均小于1，均属于部分补给情况（固相的补给不能使DGT界面处孔隙水浓度维持在初始水平）。对于R值为0.74的M1样品，Kd值较高，解吸速率常数k-1较大，在DGT放置时间T内，吸附态Cu可以迅速解吸并补给DGT的消耗，DGT界面处孔隙水Cu浓度基本维持在一个稳定的值，但低于初始浓度，吸附态Cu的消耗范围较小（<0.15cm）；对于M2和M3样品，R值、Kd和k-1均小于M1，固相的补给很小，DGT界面处孔隙水浓度随着放置时间的增加而降低，且吸附态Cu的消耗范围也较大。由模拟结果可知，沉积物中重金属释放动力学过程受到生物有效态Cu的容量和解吸动力学参数共同影响。对于稳定状态部分补给的情况（M1样品），典型特征是较高的Kd和适中的k-1；而对于非稳定态部分补给的情况（M2和M3样品），典型特征是较低的Kd值和适中或者较高的k-1。

英文摘要:

　　The DIFS (DGT induced fluxes in sediments and soils) model was used to simulate desorption kinetics of Cu from solid to liquid after depletion of DGT (diffusive gradients in thin films). Results show that the three samples used in the simulation were all in the same category of partial supply with R < 1, as the supply of Cu in solid form was not adequate to maintain the initial level of Cu concentration in the pore water at the interface of DGT. In Sample M1 (R=0.74), the distribution coefficient, Kd and desorption coefficient, k-1 were relatively high, and when DGT was in place for a given period of time, T, adsorbed Cu was rapidly desorbed to make Cu depleted, thus keeping the Cu concentration in the pore water at a constant value, which, however, was still lower than its initial value. In Samples M2 and M3, R, Kd and k-1 were all lower than in Sample M1, and its Cu supply in solid was also small, thus leading to decreasing Cu concentration of the pore water at the interface of DGT with the time of its placement, and a broader range of depletion of adsorbed Cu. The findings indicate that release of Cu from sediments is influenced jointly by the pool of bioavailable Cu and the kinetic parameters of the release. Sample M1, with steady partial supply is characterized by higher Kd and moderate k-1; whereas Samples M2 and M3 unsteady in partial supply by lower Kd and moderate or higher k-1.

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