Question 4

A toxic compound has been found to have a concentration in a lake-sediment that is 1000 fold higher (50 μmol/(kg wet sediment)) than in the lake-water (0.05 μmol/(L water)). Can we conclude from this information that the exposure of organisms to this toxic compound is higher in the sediment than it is in the water body?

Answer: What really matters is the tendency of the chemical to partition out of the water or sediment into the organism. If the chemical likes the sediment more than it likes the water phase than a higher concentration does not mean anything. In fact, both phases might well be in equilibrium, i.e. the tendency of the chemical to partition into a third phase (here an organism) may be the same. This could be tested by analysing the freely-dissolved concentration of the toxic compound in the pore water of the sediment and compare it with that in the bulk water phase.

Note that all this information about thermodynamic partition equilibria does not yet say anything about the partitioning kinetics!

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