Chemical implication of partition coefficient between suspended and dissolved Cs-137 in river water

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After the Fukushima Daiichi Nuclear Power Plant accident, terrestrial environment has been seriously contaminated by radiocesium. As a result, higher levels of radiocesium concentrations in river water have continued in Fukushima area, although they exhibit gradual decline trends. Partition coefficient between suspended and dissolved ^{137}Cs, Kd, has been introduced as a tool to have better understanding of dynamic behavior of ^{137}Cs in river system. However, the partition coefficient showed larger spatiotemporal variability. It is important to elucidate factors controlling the partition coefficient of ^{137}Cs in river system. We, here, introduce a chemical model to explain variability of the partition coefficient of ^{137}Cs in river system. The chemical model reveals that the partition coefficient of ^{137}Cs in river is inversely related to electro-conductivity and the suspended sediment (SS) concentration in river, respectively. Especially, to explain the effect of SS for Kd, presence of colloidal ^{137}Cs, passing through filter, is significant as dominant dissolved species of ^{137}Cs in river water. The result suggests that chemical speciation study of ^{137}Cs dissolved in river water is important to know chemical and ecological roles of dissolved ^{137}Cs in river water.

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