



Fluoride occurrence in environment, regulations, and remediation methods for soil: A comprehensive review

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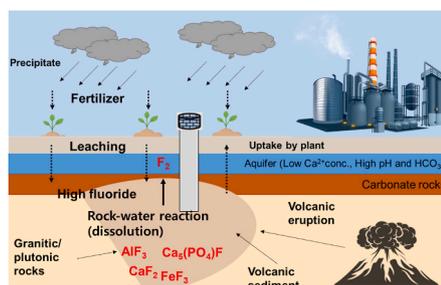
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HIGHLIGHTS

- Fluoride in soil and subsurface environments are discussed.
- Sources of fluoride in soil/water and their effects are overviewed.
- Soil quality parameters for residential land use in various countries are summarized.
- Recent advances in defluoridation methods in soil are highlighted.
- Globally organized various mitigation programs are presented.

GRAPHICAL ABSTRACT



ARTICLE INFO

Handling Editor: Lena Q. Ma

Keywords:

Fluoride in soil
Fluoride remediation
Occurrence and regulations
Mitigation

ABSTRACT

Fluoride, a naturally occurring chemical element, is largely insoluble in soils. More than 90% of the fluoride in soil is bound to soil particles and is unable to be dissolved. As part of the soil, fluoride is predominantly located in the colloid or clay fraction of the soil, and the movement of fluoride is strongly affected by the sorption capacity of the soil, which is affected by pH, the type of soil sorbent present, and the salinity. The Canadian Council of Ministers of the Environment soil quality guideline for fluoride in soils under a residential/parkland land use scenario is 400 mg/kg. In this review, we focus on fluoride contamination in soil and subsurface environments, and the various sources of fluorides are discussed in detail. The average fluoride concentration in soil in different countries and their regulations for soil and water are comprehensively reviewed. In this article, the latest advances in defluoridation methods are highlighted and the importance of further research addressing efficient and cost-effective methods to remediate fluoride contamination in soil is critically discussed. Methods used to mitigate fluoride risks by removing fluoride from the soil are presented. We strongly recommend that regulators

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<https://doi.org/10.1016/j.chemosphere.2023.138334>

Received 19 January 2023; Received in revised form 4 March 2023; Accepted 6 March 2023

Available online 7 March 2023

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Chemosphere

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