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Special Issue Reprint

Geochemical Characteristics and Contamination Risk Assessment of Soil

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Soil, a key component linking the atmosphere, hydrosphere, biosphere, and lithosphere, plays a vital role in sustaining human life and terrestrial systems globally. However, soil contamination by toxic trace metals is worsening worldwide due to urbanisation and industrialisation, posing serious risks to ecosystems and human health. Elevated trace metal levels harm the soil's biological properties, disrupt food chains, damage plants, and pollute groundwater. Assessments typically focus on total and geochemical baseline concentrations, which help distinguish natural from anthropogenic levels and calculate human contributions. When heavy metal levels exceed permissible limits, soil fertility declines, enzymatic activity is inhibited, and acidity changes.

Long-term mining and extraction cause severe environmental pollution and ecological damage, but remain essential for supplying critical raw materials to modern technologies. Growing demand for resources drives innovation, including advanced waste recycling technologies.

Mining and metallurgical waste, such as flotation tailings, red mud, and slag landfills accumulate and create significant environmental challenges. Various processing methods are applied to treat these wastes, but they remain a persistent problem. Advances in landfill processing are critical, motivating ongoing research worldwide. This Reprint will particularly address acid mine drainage treatment and acidic water neutralisation, involving hydrometallurgists and hydrogeologists.

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