
Mössbauer Study of the Attenuation of Iron in an Irrigated Greensand Lysimeter

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Abstract: Fe_{57} Mössbauer spectroscopy has been used to determine the nature of iron-containing minerals in Lower Greensand samples from an experimental lysimeter at Uffington, Oxfordshire, both before and after a three-year irrigation with a synthetic heavy metal leachate. Analysis of the spectra measured at 300° C 77° C and 4.2° K and at 4.2° K in an applied field of 45 kOe shows that iron is present in the uncontaminated sandstone in fine-grained goethite (α -FeOOH) and glauconite. In the irrigated samples iron is precipitated as a fine-grained ferric hydroxide gel having values for the hyperfine field at 4.2° K of 435 and 470 kOe. The stability of the gel over the three-year period of irrigation may be explained by surface energy considerations.

Key Words: Glauconite • Goethite • Greensand • Iron • Lysimeter • Mössbauer spectroscopy

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