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Observations on the Geochemical Barrier Capacity of Argillaceous Media [Abstract Only]

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The blend of radionuclides immobilized in buried waste is a potential source of contamination which could disperse into the environment. However, the geochemical behaviour of each radionuclide differs in the geosphere, and geological clay formations have the capacity to trap or hamper the movement of nearly all radionuclides. This cumulative geochemical barrier of natural clay formations is mainly due to the great variety of their constituents; for example, the Oligocene Boom Clay in Belgium contains various clay mineral species (smectite, illite, etc.), carbonates, pyrite, quartz, organic matter, various colloids, and an interstitial aqueous solution, containing both inorganic and organic solutes. Each of these constituents demonstrates specific affinities for one or more of the arising radionuclides, the whole geochemical barrier system being controlled by the physicochemical characteristics of the interstitial clay water.

Mathematical modelling tools, describing quantitatively the dominant phenomena in the migration process (advection, dispersion–diffusion, retardation, decay) allow prediction of the migration distances of radionuclides in clay formations.