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Sorption of chlorophenols on geotextiles of the geosynthetic clay liners and an HDPE geomembrane

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Abstract : Sorption tests were performed in the laboratory to quantify the sorption coefficient. This article describes the experimental results obtained regarding sorption on various constitutive geotextiles and bentonites of geosynthetic clay liners and high density polyethylene geomembrane of seven chlorophenols: o-chlorophenol, p-chlorophenol, 2,4-dichlorophenol, 2,4,6-trichlorophenol, 2,3,4,6-tetrachlorophenol, 2,3,5,6-tetrachlorophenol and pentachlorophenol. The majority of halogenated phenol derivatives are known to be toxic even at very low concentrations. Sorption was studied through batch sorption tests once bentonite and geotextiles were separated from each other. The result obtained is that the sorption isotherms obtained are non-linear. As far as the partition coefficient are concerned, two different trends were observed, first for geotextiles which are nonwoven needle punched, and second for geotextiles which are woven. On the contrary no significant differences were observed between powdered bentonites and granular bentonites, nor between a natural sodium bentonite and activated calcium bentonites; In this case of HDPE geomembrane, partitioning coefficients range from 2.65 to 205 respectively for 4-chlorophenol and pentachlorophenol. An increase in the partition coefficient and the permeation coefficient is observed with the increase in the number of chlorine atoms on the phenolic nucleus, probably related to the polarity of the molecules studied.
Key Words : Adsorption; Chlorophenols; HDPE geomembrane; Geosynthetic clay liners.

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