

Eurasian Soil Science 2014 vol.47 N12, pages 1216-1226

Effect of organic matter on the sorption activity of heavy loamy soils for volatile organic compounds under low moisture conditions

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Abstract

© 2014, Pleiades Publishing, Ltd. The diverse effect of the organic matter content on the sorption of vapors of aromatic and aliphatic hydrocarbons in soils under low moisture (<10.5%) has been revealed in sorption experiments using profile samples from two virgin heavy loamy dark gray forest soils characterized by relatively stable contents of finely dispersed mineral components. The decrease of the hydrocarbon sorption with increasing the content of organic matter under dry conditions (in the moisture range from 0 to 5–6%) indicates its lower sorption activity than that of the clay components and the blocking of the sorption sites on soil minerals by organic matter. At moisture contents above 5–6%, the effect of the soil composition on the sorption activity changes radically: it increases with increasing the content of organic matter. This is due to the inversion of the ratio between the activities of the soil components because of the hydrophilization of the surface of the mineral soil component. As a result, the sorption of water on the minerals reduces the mineral sorption activity to hydrocarbons to a lower level than the activity of organic matter. The maximum manifestation of the revealed blocking effect has been observed for the low-humus soils and this effect decreased with the accumulation of soil organic matter.

<http://dx.doi.org/10.1134/S1064229314120011>

Keywords

contamination, moisture, soil, soil organic matter, sorption, volatile hydrocarbons