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Characterization of sorption properties of selected soils from Lublin region by using water vapour adsorption method

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Among many methods proposed to study sorption properties of soils an analysis of adsorption/ desorption isotherm is probably the easiest and most convenient one. It characterizes both quantity and quality of mineral and organic components and also their physical and physicochemical properties. The main aim of this study is comparison of sorption properties of selected Polish soils by using water vapour adsorption method.

Samples were taken from the depth of 0-20 cm, from the Lublin region, eastern Poland. Soils were selected on the basis of their different physicochemical properties and were classified as: Haplic Fluvisol, Haplic Chernozem, Mollic Gleysol, Rendzic Phaeozem, Stagnic Luvisol, Haplic Cambisol (WG WRB 2006). Data taken from experimental adsorption isotherms were used to determine parameters of monolayer capacity, specific surface area and the total amount of vapour adsorbed at relative pressure of 0.974.

Obtained adsorption and desorption isotherms reviled that adsorbate molecules interacted with the soil particles in different extent. Similar monolayer capacity was observed for Haplic Fluvisol, Haplic Chernozem and Stagnic Luvisol, while for Mollic Gleysol was more than 4 times higher. Mollic Gleysol was also characterized by highest values of specific surface area as well as quantity of adsorbed vapour at relative pressure of 0.974.

Higher sorption was caused by presence of soil colloids which contains functional groups of a polar nature (mainly hydroxyls, phenolic and carboxyls). These groups similarly to silicates, oxides, hydratable cations as well as electric charge form adsorption centres for water vapour molecules.