Electric Conductivity Cone

pH levels

The conductivity method also yields information on the aggressiveness of ground water towards concrete. If the pH value of the soil changes from neutral, the conductivity increases. The presence of carbon dioxide in the water results in formation of carbonic acid - the factor that increases conductivity.

Inorganic salts

Water hardness related to the presence of magnesium, calcium and iron ions and the presence of sulphates - inorganic salts - is another factor, which increases subsoil conductivity.

Another application of the method can be the determination of the range of fresh and salt water in subsoil; the presence of sodium and chlorine ions in the salt water increase conductivity, facilitating discrimination of zones where salt water occurs.

Drawback

From the perspective of analysis of the pollutant, the universality of this method's application is a significant drawback. The method measures the sum of all influences against the background of the soil's natural conductivity based upon its structure, water content, mineralogical composition and the physical, chemical and biological processes taking place in the subsoil. It is therefore best to use this method to monitor zones, range and intensity of contamination of the area under study.

Execution

Depending on the way in which the problem is formulated, execution of the studies can take two directions. Firstly, in cases when the contaminating agent is known, but the range and intensity of contamination is unclear, penetration is carried out in a systematic grid to facilitate determining isolines (regions with similar concentrations of the agent). Secondly, when there are several pollutants or the pollutant is unknown, monitoring is carried out to select investigation points with the highest and the lowest level of contamination from which water and soil samples are taken for specialized chemical investigation.

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Subsoil conductivity

Besides the two standard characteristics with depth, cone resistance and sleeve friction, this method also yields distribution of subsoil conductivity with depth. Like the standard CPT, the basic penetration parameters (qc, fs) enable classification of soil.

Contamination

The measurement of conductivity in subsoil facilitates separation of zones with differentiated water content including determination of the water table depth and thickness of the zone of capillary ascent. The most important application of the conductivity cone, however, is related to evaluation of the degree of contamination of a soil medium containing electrolytes (the compounds dissociating into ions in water).

Inorganic acids

Since hydrogen and hydroxide ions have the highest conductivity, the easiest way to detect strong inorganic acids, hydroxides and their salts in soil is to use this method. With respect to this aspect, the conductivity method may be applied to identify zones with increased concentrations of nitrites and nitrates, sulphates, calcium and magnesium compounds or concentrations of heavy metals. If aromatic amines are found in the subsoil, compounds dissociating in the water solution, which bring about an increase in conductivity may indicate an excess of N-fertilizers.

Hydrocarbons

Limited application of this method may concern the areas degraded by hydrocarbons in soil. Oil derivatives do not dissociate into ions, rendering direct detection of them with the conductivity method impossible. In certain cases, however, it is possible to indirectly estimate the presence of hydrocarbons when there are phenols in the subsoil - products of the reaction of aromatic compounds, which dissociate in water.