

Basic knowledge

Soil treatment

Contaminants in the soil – a threat to the environment

In the past, the use of environmentally hazardous substances was often not given the necessary attention. This allowed toxic substances, such as chlorinated hydrocarbons, to enter the ground in many places. Much of this contamination comes from landfills and former industrial sites and poses a threat to the environment, and to ground-

water in particular. Remediation of the contaminated soil must be undertaken in such cases. A number of different methods are available depending on the type of soil and type of contamination.

Soil: a multi-phase mixture

Usually all three phases (solid, liquid and gaseous) are encountered in the soil. Similarly, all three phases can be affected by contamination. Soil treatment requires a holistic approach which takes all three phases in the soil and their complex interactions into account.



Treatment of contaminated soils: a complex task

The main objective of soil treatment is to protect the groundwater and – as far as possible – to restore the original function of the contaminated soil. Due to the fact that all three phases can be affected by the contamination, soil treatment is a very complex task.

In addition to the contaminated soil, loaded contaminated water and exhaust air also usually occur during treatment. These also require treatment, for which, in turn, current processes of water treatment and air pollution control are used. Fundamentally, two different approaches can be distinguished in soil treatment:

In-situ

The treatment takes place directly in the soil, i.e. at the site of contamination.

Ex-situ

The contaminated soil is removed and treated externally in a plant.

In-situ soil treatment

In-situ treatment of soils is particularly suitable for the liquid and gaseous phase:

- **liquid phase:** pump and treat
- **gaseous phase:** soil vapour extraction

In both methods, the fluid is pumped out of the ground, the contaminants separated from the fluid and the cleaned fluid then passed back into the soil. The separation of contaminant and fluid is performed either with conventional methods for water treatment (pump and treat) or with the processes of air pollution control (soil vapour extraction).

Ex-situ soil treatment

In the ex-situ treatment of soils the contaminated soil is firstly removed. Then the soil is treated in special plants. Most methods used here have their origins in the field of mechanical or thermal process engineering. Typical processes used for soil treatment include:

- comminution
- screening
- solid-liquid separation
- separation of small particles (e.g. with hydrocyclone)
- solid-liquid extraction

