

# SELECTIVE REMOVAL OF PERCHLORATE FROM WATER AND BRINE — A NOVEL PRECIPITATION APPROACH

Perchlorate ( $\text{ClO}_4^-$ ) is a water-soluble anion, commonly used as an oxidizer in propellants for the ammunition industry and other niche uses. Because of its high mobility and persistence in groundwater, perchlorate has become a pollutant of concern due to its potentially harmful effect on human health through its negative impact on the thyroid gland. In groundwater, perchlorate can be found in concentrations ranging from few micrograms per liter ( $\mu\text{g/l}$ , ppb) to grams per liter ( $\text{gr/l}$ ).



## COMMON GROUNDWATER TREATMENT TECHNOLOGIES FOR PERCHLORATE REMOVAL

While technologies for treating the ppb level are based on ion exchange, high concentrations are usually treated with biological water treatment. The main drawback of biological technology (BT) is the large infrastructure required and sludge production as a byproduct of the biological processes. Since high concentrations of perchlorate are usually the result of historical leakage to groundwater and geographically adjacent to the source of pollution, in many cases, concentrations are expected to decline rapidly in the first 3-5 years of treatment. However, treatment facilities continue to operate for many more years before the contamination is completely removed. This leads to systems with considerable redundancy for most of the operation period.

## TOXSORB'S UNIQUE ECOLOGICAL AND ECONOMICAL GROUNDWATER TREATMENT PROCESS

Traditionally, perchlorate has been considered unprecipitable. ToxSorb has developed a one-of-a-kind technology that allows perchlorate precipitation through an agent, producing a non-soluble complex that can be separated from water and brine through physical means. Consequently, it reduces the size of the biological treatment system, saving both CAPEX and OPEX. Furthermore, the precipitation technology extracts  $\text{ClO}_4^-$  as potassium perchlorate ( $\text{KClO}_4$ ) creating economical value in the same order of magnitude as the OPEX of the precipitation technology. Once separated, the precipitating agent (PA) can be recovered for reuse.

ToxSorb's unique approach to perchlorate removal can be implemented both in groundwater remediation and product cleaning such as fertilizers, where high selectivity is essential.

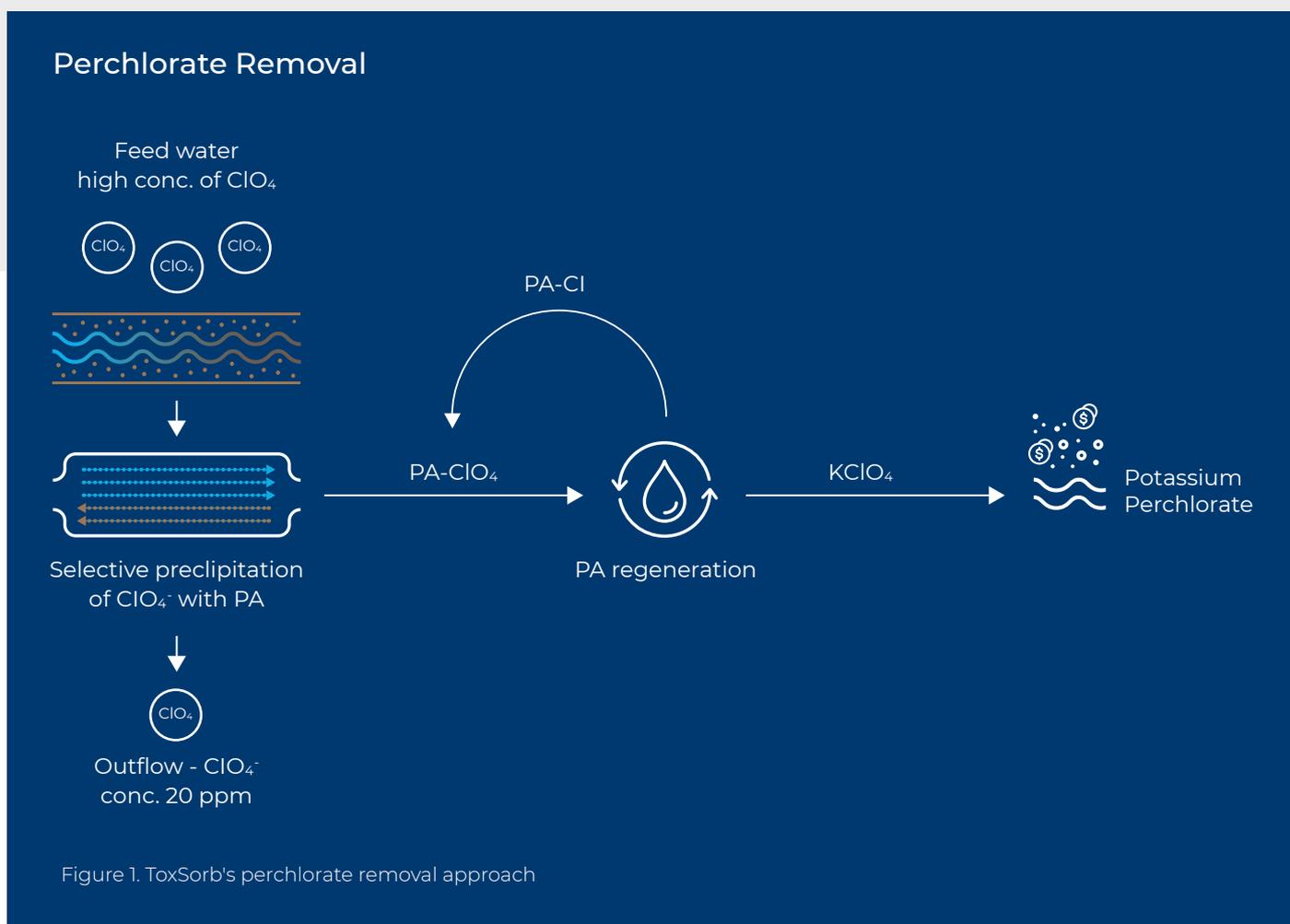


Figure 1. ToxSorb's perchlorate removal approach

Through the selective removal of contaminants such as perchlorate from groundwater using regenerable process which eliminates the need for liquid fraction handling, ToxSorb provides an eco-friendly and sustainable solution. Minimizing haulage and saving costs, our technology and solution contribute to a circular economy, preserving the environment while promoting community health and wellbeing.