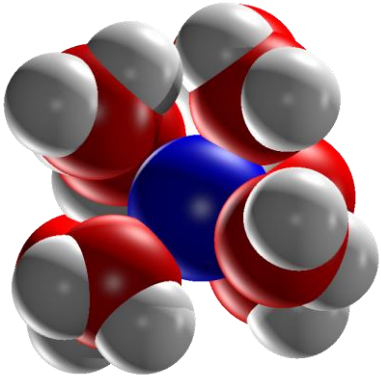
MOL®KAT: What is it?

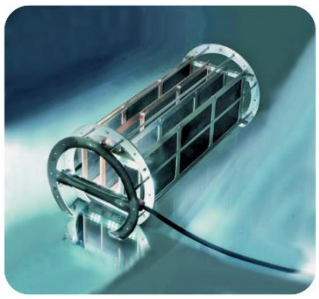


MOL®KAT is a biocide-free – technically proven catalytic water treatment technology – that addresses the phenomenon of biofilm formation (fouling, contamination, scaling) and corrosion on surfaces.

This technology has demonstrated that large cooling circuits of power plants can be treated entirely without the use of biocides. *(ref. UNIPER Kraftwerke GmbH, Kraftwerk Schkopau in Germany)*

Following initial reliable results with relatively stable water quality, such as tap and cooling water, this catalytic water treatment was tested in more challenging sectors. Within the INSPIREWATER project, its potential to improve membrane filtration performance for wastewater reuse was positively evaluated. *(see page 42-onwards)*

The core element of the MOL®LIK technology is an ultra-thin (20µm) metal foil made of a nickel/chromium/iron alloy, coated with a patented mineral layer. (called NOA or Nanostructured Oxide Alloy).



These passive catalysts act as semiconductors, providing a place for electron exchange (H^+ receives electrons, and OH^- donates electrons).

This accelerates hydrolysis reactions and the formation of solvation shells between the molecules. It improves the fast restoration of the natural equilibrium between 'bulk' water and 'molecular' water. (see solvatation/hydration and hydrolysis effect).

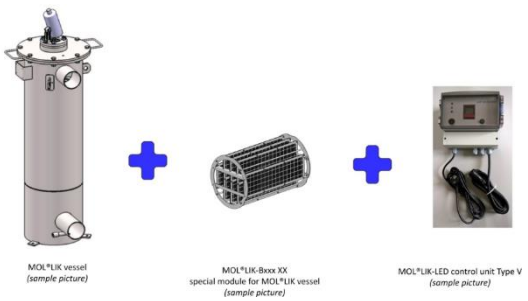
In practice, this mechanism offers several advantages:

- Improved solubility properties of water
- Prevention of deposits and biofilm formation, leading to less contamination on surfaces
- Systematic removal of existing deposits (curative effect)
- Increased flux, resulting in more stable operation of membrane filtration units
- Improved natural evaporation of water
- Discouraging the optimal conditions for microbiological growth

By preventing biofilm formation and reducing air bubbles towards microbubbles, an *indirect* biocidal effect is achieved. This catalytic action does not fall under biocide regulations and facilitates compliance with QHSE guidelines.

Installation is simple and modular. Several standard housings for pressure or pressure-less applications are available, as well as custom structures depending on the intended function reauired.

The effectiveness of the catalytic reaction can be enhanced by the occasional presence of daylight or the use of LED light in the visible frequency spectrum (MOL®LIK).



Typical Application Areas

- Cooling circuits
- Industrial and domestic sanitary installations
- Public/private swimming pools (optimizing hydrolysis reaction)
- Air humidification systems
- Drinking water in poultry farming
- Agriculture
- Pulp and paper manufacturing
- Filtration units (membrane, RO, activated carbon)
- …

Advantages

- Cost savings through:
  - Reduction of chemical consumption
  - Reduction of maintenance intervals (MTBF)
  - Extension of component lifespan
  - More stable operation of the installation
- Non-corrosive and leaves no by-products
- Avoidance of hazardous biocides, easier govt compliance

References and Further Information

- BECKER ET AL.: "Mikrobiologisch einwandfrei – Mineralmetallfolien vermeiden Biozideinsatz in großen Kühlkreisläufen"; (Ensuring microbiologically perfect larger cooling loops - mineral metal foils avoid the use of biocides) Verfahrenstechnik 05/2020; Vereinigte Fachverlage GmbH (2020), pp. 12-13
- SUHR ET AL.: "Best Available Techniques (BAT) Reference Document for the Production of Pulp, Paper and Board"; JRC Science and Policy Reports; European IPPC Bureau; 2015
- VAN DIJK ET AL.: "Innovative Solutions in the Process Industry for next generation Resource Efficient Water Management"; Collaborative project; Innovation roadmap for demonstrated technologies; INSPIREWATER – D2.4 GA723702 (2019) pp. 42-52
- COMMITTEE FOR HAZARDOUS SUBSTANCES: TRGS 600; Technical rules for hazardous substances; Federal Institute for Occupational Safety and Health (BAuA); Version 10/2020; Link to document
- Improved filterperformance,reduced chemical usage (GE-2019)
- "Optimizing Cooling Water Treatment," Watersolutions magazine 1-2024
- Cooling water treatment at KNG Rostock power plant
- Cooling water treatment at Proferro foundry, Ypres