

KATALOX-LIGHT®

UNDERSTANDING THE GAMMA SURFACE

Hydrogen-ion uptake • pH response • Metal precipitation • Filtration

**MORE H⁺ BOUND AT THE SURFACE.
LESS H⁺ ACTIVITY IN THE WATER.
HIGHER pH.**

POROUS
GAMMA SURFACE
FOR A CLEANER
TOMORROW.

THE SURFACE MECHANISM

Watch Water's "Katalox-Light and High pH" concept describes hydrogen ions binding to the negatively charged gamma surface. This explains the pH response and how it connects with metal removal.



01 WHAT pH ACTUALLY MEASURES

pH describes the hydrogen-ion activity in water.

$$\text{pH} = -\log_{10} a(\text{H}^+)$$

More H⁺ activity means lower pH. Less H⁺ activity means higher pH. H⁺ represents hydrogen ions, not hydrogen gas molecules. A change from pH 8 to pH 11 means a 1,000-fold decrease in hydrogen-ion activity. It does not by itself measure the water's total acidity or buffering capacity.

02

THE SURFACE CAN TAKE UP H⁺

Hydroxylated manganese-oxide surfaces can exchange protons with water. A negatively charged oxygen site can bind a hydrogen ion:



The symbol $\equiv$ indicates attachment to the solid surface. This process is called surface protonation. Net uptake of H⁺ can shift the water toward a higher pH while the surface and water approach equilibrium.

03 WHY THE GAMMA SURFACE MATTERS

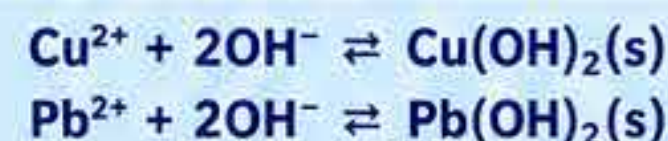
Large, accessible surface area provides reactive sites. The gamma designation identifies a structural form with high reactivity; it does not automatically mean twice the charge or twice the surface area.

A protonated site becomes less negatively charged. Surface proton uptake has a finite capacity, so sustained performance depends on the overall water-media chemistry.

04

HIGHER pH SUPPORTS PRECIPITATION

At constant temperature, lower H⁺ activity corresponds to higher OH⁻ activity. Under suitable conditions, hydroxide ions react with dissolved metals to form poorly soluble solid particles:



Precipitation occurs when the solubility limit is exceeded. Each metal has its own useful pH range; carbonates and complexing substances also influence removal.

05 ADSORPTION AND OXIDATION ALSO HELP

Available surface sites can bind metal ions directly. This adsorption complements precipitation. Dissolved iron and manganese may also require oxidation before forming readily removable solids.

Oxygen or a suitable oxidant, adequate contact time and appropriate pH support these reactions.

06

THE FILTER COMPLETES THE REMOVAL

Katalox-Light retains precipitated metal compounds and suspended particles in the granular bed. Backwashing removes accumulated solids into a separate waste stream.

The metals are separated from the treated water; they are not destroyed. Successful treatment combines the right chemistry with adequate bed depth, filtration rate and backwash performance.

WHY NO SEPARATE ALKALINE DOSING MAY BE NEEDED

Water-media reactions can change pH directly inside the filter. Surface proton uptake provides one possible contribution without a separate alkaline dosing pump. Water quality measurements are needed to distinguish its contribution from hydrated lime, CO₂ loss or other factors.

THE RIGHT pH FOR REMOVAL – THEN THE RIGHT pH FOR USE

Optimize treatment for the actual metals and water. Excessively high pH can increase the solubility of some metals. Remove precipitated solids before any downstream pH adjustment, then verify dissolved and total metals in the finished water.

WATCH WATER®



CLEAN WATER
SOLUTIONS



PROVEN
TECHNOLOGY



REAL
PERFORMANCE



A CLEANER
TOMORROW

GERMAN WATER TECHNOLOGY - SURFACE CHEMISTRY. PRECIPITATION. SEPARATION.

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