

## **Chemical Compatibility and Impact Analysis of HYTREAT 5700 and HYTREAT 2200**

### **Potential Reactions**

#### **1. Chemical Incompatibility Between Corrosion Inhibitors and Biocides**

Mixing HYTREAT 5700, which contains corrosion inhibitor components such as sodium molybdate and tolyltriazole, with HYTREAT 2200, which contains glutaraldehyde and quaternary ammonium compounds, may result in chemical incompatibility. Tolyltriazole is known to interact with cationic substances, including quaternary ammonium compounds, potentially leading to partial neutralization or complex formation. These interactions may alter the chemical stability of both formulations and result in unpredictable behavior when mixed directly.

#### **2. Reduction in Biocidal Performance**

The effectiveness of the biocidal components in HYTREAT 2200 may be reduced when mixed directly with HYTREAT 5700. Corrosion inhibitors such as tolyltriazole and inorganic salts like sodium molybdate can interfere with the antimicrobial action of glutaraldehyde and quaternary ammonium compounds. This reduction in biocidal efficiency may lead to insufficient microbial control within the system, increasing the risk of biofouling, microbiologically influenced corrosion (MIC), and deterioration of system hygiene.

#### **3. Formation of Precipitates or Physical Instability**

Direct mixing of HYTREAT 5700 and HYTREAT 2200 may cause physical instability, such as turbidity, precipitation, or phase separation. Interactions between inorganic corrosion inhibitors and organic biocidal compounds can reduce solubility and lead to the formation of insoluble complexes. The presence of precipitates can obstruct dosing lines, injectors, filters, and heat exchange surfaces, negatively affecting chemical distribution and overall system performance.

#### **4. Increased Occupational Health and Safety Risks**

HYTREAT 2200 contains glutaraldehyde and quaternary ammonium compounds, both of which are known to be hazardous to human health, particularly as skin and respiratory sensitizers. Mixing these substances with other chemicals increases the risk of vapor or aerosol release during handling, transfer, or accidental spills. Exposure to the mixed formulation may cause eye and skin irritation, respiratory discomfort, or allergic reactions, especially in poorly ventilated environments or during manual operations.

### **Mandatory Control Measures**

#### **1. Prohibition of Direct Mixing in Concentrated Form**

HYTREAT 5700 and HYTREAT 2200 shall not be mixed directly in their concentrated form within the same container, tank, or transfer system. Direct mixing significantly increases the likelihood of chemical incompatibility, loss of product



performance, and safety hazards. Each product shall be handled and stored separately in accordance with the respective Safety Data Sheets.

## **2. Use of Separate Dosing Systems and Injection Points**

Each product shall be applied using separate storage tanks, dosing pumps, and injection lines. Separate injection points ensure that both chemicals are adequately diluted within the system before any potential interaction occurs. This approach minimizes the risk of precipitation, chemical neutralization, and localized high-concentration exposure.

## **3. Controlled Injection Timing and Adequate Dilution**

Adequate separation in dosing time shall be implemented to allow each chemical to be fully dispersed and diluted prior to the introduction of the other. Controlled injection timing reduces the likelihood of direct contact between incompatible components and helps maintain the effectiveness and stability of both products within the system.

## **4. Implementation of Personal Protective Equipment (PPE) and Engineering Controls**

All handling and dosing activities shall be conducted using appropriate Personal Protective Equipment (PPE), including chemical-resistant gloves, safety goggles or face shields, protective clothing, and respiratory protection where required. Engineering controls such as proper ventilation, spill containment, eyewash stations, and safety showers shall be provided to minimize occupational exposure and ensure worker safety.

## **5. Laboratory-Scale Compatibility Testing Prior to Field Application**

If the combined use of HYTREAT 5700 and HYTREAT 2200 within the same system is required, compatibility testing shall first be conducted at laboratory scale under controlled conditions. The testing shall evaluate physical stability, chemical compatibility, and biocidal effectiveness. The results shall be documented and reviewed by qualified technical personnel before any field application is approved.

