Chemical Formula: NaNO₂

Molecular Weight: 69

Equivalent Weight: 34.50

Purpose: Anodic corrosion inhibitor for mild steel, cast iron, galvanized steel, aluminum, and tin.

Applications: Closed hot and chilled water loops and glycol systems.

Functionality: Forms an impervious oxide film to protect the metal from further attack. This layer is formed by the combined action of nitrite and dissolved oxygen and then kept in repair by the nitrite alone. Nitrite is not consumed to any practical extent since little is needed to form this thin film.

Dosage Range: 300 to 2000 ppm as NO₂. The concentration required increases with temperature.

Synergies: Sodium nitrate, sodium molybdate, sodium silicate. Nitrite-polyphosphate mixtures have been reported to give longer lasting films than obtainable alone.

Tests: Hach NitroVer 2 or KMnO₄ titration.

Concentration Effects:

Too Low: Nitrite can sometimes be considered a “dangerous” corrosion inhibitor because too low concentrations (<300 ppm) can result in more corrosion than no nitrite at all. This occurs because the nitrite concentration is too low to repair breaks in the passivated film on the metal surface. In a galvanic reaction, metal loss occurs at the anode. Since nitrite is an anodic inhibitor, metal loss becomes concentrated in these film breaks and can cause pitting.

Too High: Very high concentrations of nitrite can damage mechanical seals, gaskets, and hosing. Nitrite is a mild oxidant. High levels of nitrite can oxidize and degrade gaskets and hosing. High levels of nitrite (>4,000 ppm NO₂) also add to the dissolved solids content of the water. Water that makes it past the mechanical seal on a pump will evaporate and leave the dissolved solids behind. These accumulated dissolved solids can eventually abrade the mechanical seal away.
**Microbiological Effects:** Nitrifying and de-nitrifying bacteria are nourished by nitrites and can convert them to nitrates, ammonia, and nitrogen. Nonoxidizing biocides should be used. If there has been no water loss and the conductivity and other tested parameters have remained the same, but the system nitrite level drops, this could be an indication of microbiological activity. Test for aerobic and anaerobic microbiological activity.

**Temperature Effects:** Decomposes above 60°F.

**pH Effects:** Nitrates perform best in a pH range of 8-10 and should never be allowed to drop below 7. Borate buffers are often used in nitrite formulations to maintain a safe pH.

**Solubility:** 7 lb/gal @ 70°F or 46% soluble at 68°F.

**Reactivity:** Nitrite is a mild oxidant.

**Incompatibilities:** Oxidizing biocides should not be used. Only non-oxidizing biocides should be used. Reducers such as sodium sulfite or hydrazine should not be used since they will reduce the nitrite to nitrate. Chlorides and sulfates will reduce effectiveness unless dosage is increased.

**Other Information:** The presence of oxygen is not necessarily detrimental to the system and can play a role in the formation of the passivated film on the metal surface. Sodium nitrite is not recommended as a corrosion inhibitor for copper or copper alloys.