Nitrogen, Nitrite

For water and wastewater **Ferrous Sulfate and Diazotization Methods**

Introduction

Nitrite nitrogen occurs as an intermediate stage in the biological decomposition of compounds containing organic nitrogen. Nitrite-forming bacteria convert ammonia under aerobic conditions to nitrites. The bacterial reduction of nitrates can also produce nitrites under anaerobic conditions. Nitrites are often used as corrosion inhibitors in industrial process water and cooling towers; the food industry uses nitrite compounds as preservatives.

Because nitrites readily oxidize to nitrates, they are not often found in surface waters. The presence of large quantities of nitrites indicates partially decomposed organic wastes in the water being tested. Drinking water concentrations seldom exceed 0.1 mg/L of nitrite.

The high range nitrite test is a modification of the classical brown ring test for nitrate using ferrous sulfate. By controlling the sample pH, the nitrite present is reduced to nitrous oxide, which reacts with the indicator to form a greenish-brown color. Nitrates are not registered in the test. All necessary reagents have been combined in a single powder pillow form called NitriVer 2 Nitrite Reagent Powder. A special agent helps prevent color formation or precipitation of common interfering ions.

The low range nitrite test uses chromotropic acid and sulfanilic acid as the indicator. The indicator and a buffer are combined in a single powder NitriVer 3 Nitrite Reagent. The test is sensitive to low nitrite concentrations.

Chemical reactions

High range, ferrous sulfate method

In an acidic medium ferrous sulfate reduces nitrogen in nitrite (NO_2^-) to form nitrous oxide (NO). Ferrous ions combine with the nitrous oxide to form a brown-colored complex ion, the color intensity of which is in direct proportion to the nitrite present in the water sample. Color development follows Beer's Law.

$$2Fe^{2+} + 4H^+ + 2NO_2^- \rightarrow 2Fe^{3+} + 2NO + 2H_2O$$

$$NO + FeSO_4 \rightarrow FeSO_4 \cdot NO$$

Low range, diazotization method

In the low range nitrite test, nitrite ions react with sulfanilic acid to form an intermediate diazonium salt. This reacts with chromotropic acid to produce a red-orange complex directly proportional to the amount of nitrite present. A measurement of the color intensity will provide an accurate determination of the nitrite concentration in the water sample.

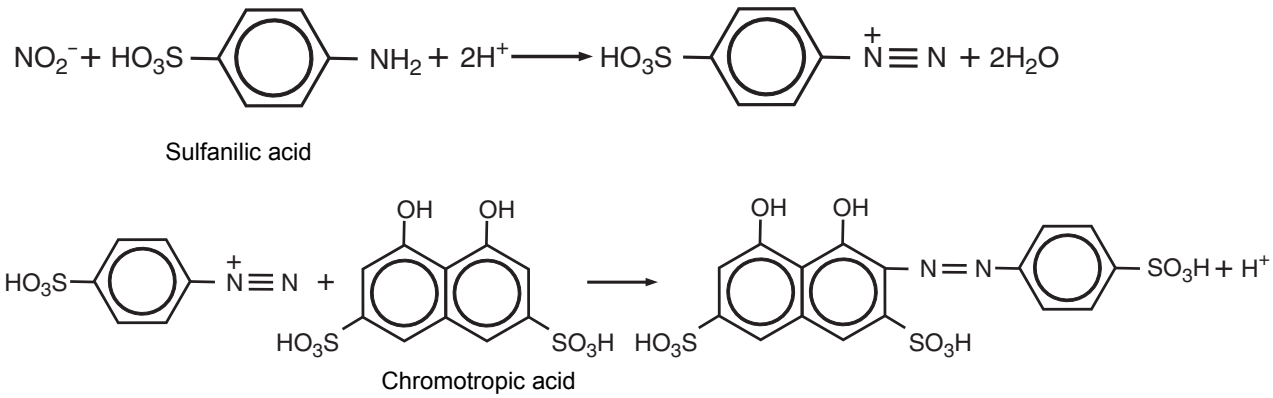

Figure 1 Chemical reaction for Low Range Diazotization method