Ozone

For water **Indigo Method[1]**

[1] Adapted from: Analytical Aspects of Ozone Treatment of Water and Wastewater; Lewis Publishers: Chelsea, Michigan, 1986; pages 153–156.

Introduction

Ozone (O_3), a powerful oxidant, is being increasingly used for water disinfection. It was first used in the Netherlands in the late 1800's to disinfect drinking water, and is now used worldwide in drinking water and wastewater facilities, swimming pools, spas, and in the bottled water and beverage industries. Ozone quickly provides microbial sterilization and disinfection, organic compound destruction and conversion of iron or manganese salts to insoluble oxides which can be precipitated or filtered from the water. The major reaction by-products are oxygen, water and carbon dioxide. For environmental safety, unreacted or residual ozone should be monitored.

Chemical reactions

As ozone reacts quantitatively with indigo trisulfonate (blue indigo dye), the color of the solution fades. Color intensity, inversely proportional to the amount of ozone present, is then measured at 600 nm with a photometer (colorimeter or spectrophotometer). The reagent is formulated to prevent interference from any chlorine residual which may be present.

Traditionally, ozone loss during sampling is a major cause of analytical error. Ozone is liberated when the sample is transferred from container to container, the loss causing erroneously low determinations. The evacuated AccuVac™ Ampuls draw the sample directly from the water stream or source in seconds. Ozone liberated while rushing into the Ampul is trapped there and reacts immediately with the indigo reagents. The reagent buffers the sample solution to pH 2.5. The Ampul is then placed directly in a photometer and measurements are taken in the reaction vial, eliminating cross contamination between samples.

AccuVac Ampuls for analysis cover three ranges: low range (0–0.25 mg/L), medium range (0–0.75 mg/L), and high range (0–1.50 mg/L). The lower ranges are necessary because small amounts of ozone will bleach the indigo dye only slightly. This slight decrease in color is difficult to detect if the original blue color is very intense, as it is with the high-range Ampuls.

The low and medium-range tests are designed with less intense color so that a slight bleaching can be more easily detected, thereby producing results accurate to as little as 0.01 mg/L. Conceptually the reaction may be described as:

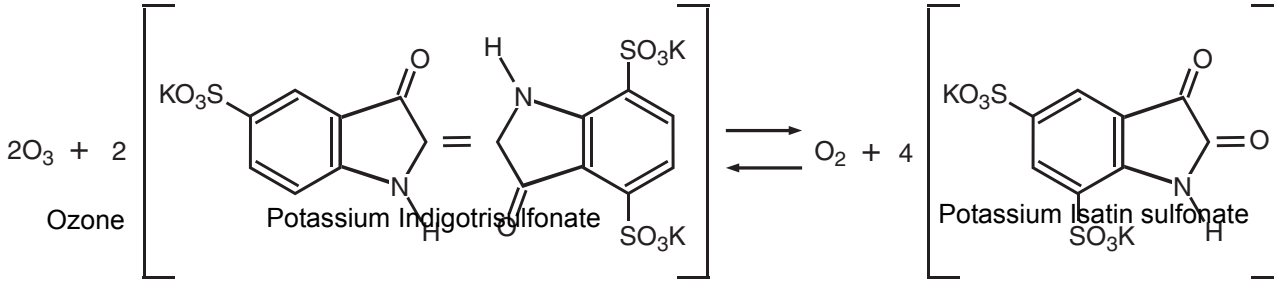

Figure 1 Chemical reaction for ozone determination, indigo method