Chloramine (Mono)

For water and wastewater **Indophenol Method**

Introduction

Chloramination disinfection is the practice of forming inorganic chloramines in water to reduce microbial concentrations to within acceptable limits. The chloramines; monochloramine (NH_2Cl), dichloramine ($NHCl_2$) and nitrogen trichloride (NCl_3), form when chlorine and ammonia are combined in water. Traditionally, treated wastewater, which contains ammonia, is disinfected by the addition of chlorine. In recent years, many drinking water facilities have converted to chloramination to disinfect potable water. Roughly 20% of all drinking water facilities in the United States now use chloramines as the residual disinfectant.

For the chloramination of drinking water, monochloramine is the preferred disinfectant. Formation of dichloramine and nitrogen trichloride is avoided, since more chlorine is consumed and the presence of these chloramines can produce odors or off-tastes.

In treated wastewater, any organic nitrogen compounds present will form organic chloramines during chlorination. Organic chloramines, as a class, are much weaker disinfectants than the inorganic chloramines. Chlorine overfeeds and ineffective mixing can lead to greater production of organic chloramines, thereby diminishing the total germicidal activity.

Hach chemists have developed a method for the specific determination of monochloramine in water. The method is based on the classic indophenol chemistry for determining ammonia. The chemistry has been improved to increase the specificity of the method for inorganic monochloramine in the presence of organic chloramines. In addition, the method was modified to greatly accelerate the color development time and increase the precision of the test. The new test has been shown to be specific for monochloramine, without interference from organic or inorganic amines, dichloramines, free chlorine, organic chloramines, nitrites or manganese.

Chemical reactions

Monochloramine reacts specifically with a substituted phenate to form a quinone imine intermediate. In the presence of a cyanoferrate, the intermediate couples with excess phenate to form a green-colored indophenol. The amount of indophenol formed is proportional to concentration of monochloramine in the sample. See the *Chemical reactions* figure below.

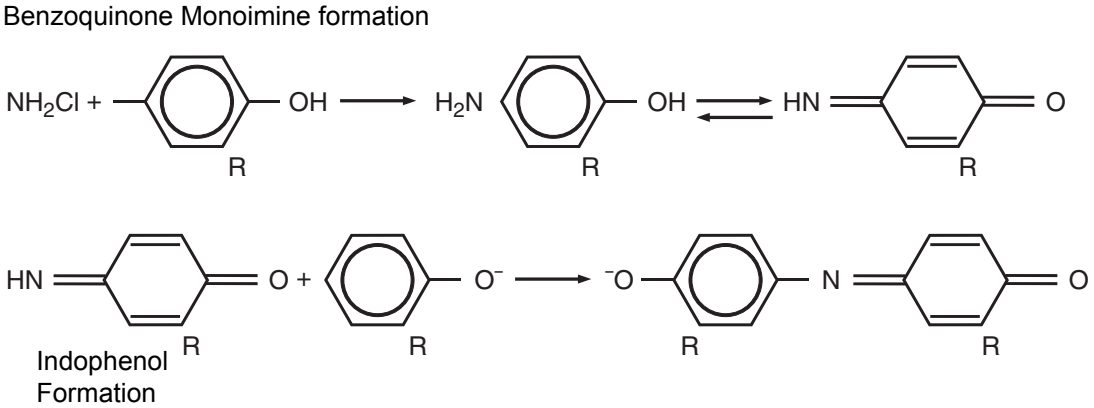

Figure 1 Chemical reactions[1]

[1] R= reaction accelerating group