Zinc

For water and wastewater **Zincon Method**

Introduction

Zinc concentrations in most water supplies average about 1 mg/L, but may range as high as 50 mg/L in some areas. Although zinc is commonly found in many natural waters, the deterioration of galvanized iron and leaching of brass can add substantial amounts. Industrial effluents may contribute large amounts of zinc; high concentrations suggest the presence of lead and cadmium, both common impurities from the galvanizing process.

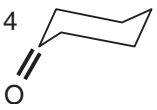
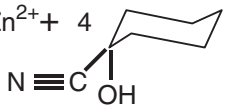
Zinc is essential to human metabolism and has been found to be necessary for proper growth. High concentrations of zinc in water act as stomach irritants but the effects are temporary. Concentrations above 5 mg/L show no harmful physiological effects but can cause a bitter taste and/or an opalescence in alkaline drinking water.

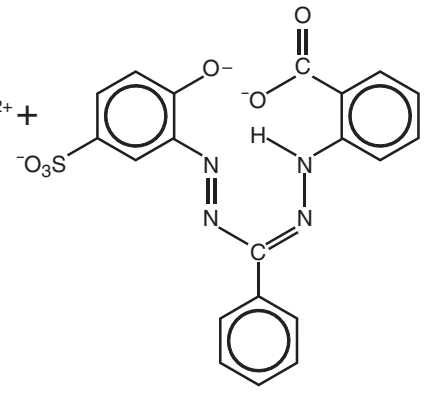
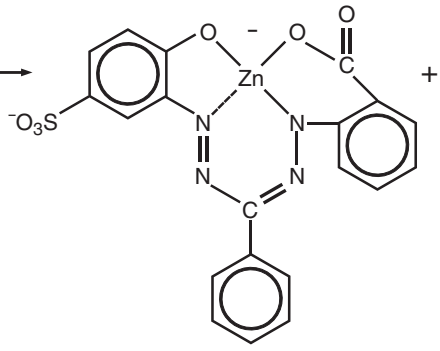
A dry powder form of 2-carboxy-2'hydroxy-5'sulfoformazyl benzene indicator, commonly called zincon, is used in the ZincoVer® Method of determining zinc concentrations. This test has been approved by the Environmental Protection Agency for National Pollutant Discharge Elimination System-reporting purposes based on comparability studies if the sample is first digested. Testing done for non-reporting purposes generally does not require sample digestion.

Chemical reaction

In the analysis of zinc, cyanide is added to a buffered water sample of pH 9 to form a complex with all heavy metals present in the sample. (1) The addition of cyclohexanone then frees the zinc from the cyanide complex (2) and enables it to react with the indicator, zincon (3) a blue-colored complex forms in direct proportion to the amount of zinc in the sample. Measurement of the color intensity determines the zinc concentration.

(1) $Zn^{2+} + 4CN^{-} \longrightarrow Zn(CN)_4^{2-}$

(2) $Zn(CN)_4^{2-} +$  $+ 4H_2 \longrightarrow Zn^{2+} + 4 +$  $+ 4OH^{-}$

(3) $^{-}OH + Zn^{2+} +$   $+ H_2O$

Zincon (orange) (Blue)