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ChemScan® Method Summary #123 Molybdate Analysis for Cooling and Boiler Water Treatment

Background

Molybdate is used as a corrosion inhibitor in recirculating cooling and boiler systems. Corrosion inhibitors produce a film on iron or steel surfaces which reduces the total surface area available to participate in corrosive reactions. Anodic corrosion inhibitors include chromate and zinc, but molybdate is considered to be more acceptable from an environmental perspective. The effectiveness of molybdate is often improved by use of this inhibitor in combination with organophosphorous or polyphosphate treatment programs.

Applied alone or as a corrosion inhibitor for mild steel, molybdate requires an initial concentration of 40-60 ppm, with a maintenance concentration of 5-20 ppm and pH at 7.5 or higher. Closed systems require even higher concentration, often 100-200 ppm.

Standard Analysis Techniques

Molybdenum is usually detected using atomic absorbance spectrometry for high accuracy analysis, but reagent based test kits are also available for field use. These kits are based on colorimetric analysis using mercaptoacetic acid reagent. Accuracy is poor at low (1-3 ppm) concentration ranges and the method requires sample dilution for high (25 ppm and above) range analysis.

ChemScan Analysis Method

Free molybdate has a unique absorbance signature in the ultraviolet wavelength range and can be accurately detected by ChemScan at low or high concentration without the use of reagents. If normal applied concentrations are maintained below 5 ppm, an expanded path length may be required for primary (no reagent) analysis.