

ABSTRACT

Orthophosphate and sodium hexametaphosphate (a polyphosphate) are used in water treatment as anti-corrosives. Although generally recognized as safe, allergic reactions have been documented recently to sodium hexametaphosphate. It was the purpose of this study to identify and to determine the presence of ortho and hexametaphosphates in commercial anti-corrosives. Water treatment stations known to use phosphate anti-corrosives were surveyed (with the help of the Tennessee State Division of Water Supply) and analyzed using two methods:

- (1) visible spectroscopy at 890 nm of an oxidized molybdenum complex
- (2) ^{31}P NMR

The survey results revealed that many of the stations participating believed their products had some polyphosphate content. The commercial products analyzed were Aqua Mag, sodium hexametaphosphate, and zinc orthophosphate (Calgon C-9L). It was confirmed by both methods that Aqua Mag contains appreciable amounts of hexametaphosphate, and that sodium hexametaphosphate appears to naturally hydrolyze over a period of time to orthophosphate. No polyphosphate contamination was found in zinc orthophosphate. ^{31}P NMR analysis gave excellent qualitative results with a single peak at about 4 ppm for orthophosphate and peaks at -5 and -20 ppm for metaphosphate. Future work will involve a more extensive survey, kinetic studies of the metaphosphate hydrolysis, and determination of the exact chain length of the hexametaphosphate molecule.