**The Effect of Catalysts on the Removal of Dissolved Oxygen from Water by Sodium Sulfite**

Walter Maurice Kane 1940

**Polygarniture**

K. Yama 1955

**The Effect of Catalysts on the Removal of Dissolved Oxygen from Boiler Water by Sodium Sulfite**

Beverly Cameron Smith 1957

**Removal of Dissolved Oxygen in Ultrapermeable Water Production**

Mon Schoon, Su Lin Tai, Chaukong 1995

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T. Sekiguchi 2012-12-06

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Experience with Copper Oxide Production in Antiproton Source Components at Fermi National Accelerator Laboratory. 2000 The Antiproton (Pbar) Source at Fermi National Accelerator Laboratory is a facility comprised of a target station, two rings called the Debuncher and Accumulator and the transport lines between those rings and the remainder of the particle accelerator complex. Water is by far the most common medium for carrying excess heat away from components, primarily electromagnets, in this facility. The largest of the water systems found in Pbar is the 95 degree Fahrenheit Low Conductivity Water (LCW) system. LCW is water which has had free ions removed, increasing its resistance to electrical current. This water circuit is used to cool magnets, power supplies, and stochastic cooling components and typically has a resistivity of 11--18 megohms-cm. For more than ten years the Antiproton rings were plagued with overheating magnets due to plugged water-cooling channels. Various repairs have been tried over the years with no permanent success. Throughout all of this time, water samples have indicated copper oxide, CuO, as the source of the contamination. Matters came to a head in early 1997 following a major underground LCW leak between the Central Utilities Building and the Antiproton Rings enclosure. Over a span of several weeks following system turn-on, some twenty magnets overheated leading to unreliable Pbar source operation. Although it was known that oxygen in the system reacts with the copper tubing to form CuO, work to remedy this problem was not undertaken during this time period. Leaks, large quantities of make-up water, infrequent filter replacement, and thermal cycling also result in an increase in the corrosion product release rate. A three-week cooling channel cleanup, a two-week cooling channel replacement, and a 7-month cryogenic system outage were performed and all of this was to increase the effectiveness of the use of sulfite as an oxygen scavenger in closed water systems. The chelating agent chosen was disodium ethylenediamine tetraacetate (Na2EDTA). Other inhibitors were also included in some of the experiments. The saturation of sodium sulfite was inhibited by the EDTA. Results of experiments show that, when ions of copper and iron are chelated with EDTA, they no longer catalyze the oxidation of Na2SO3.