

Introduction

Our team is working with Plastic Plate Inc, a chrome electroplating facility located in Grand Rapids, Michigan. Their electroplating process produces waste containing heavy metals that need to be treated before being sent to the municipal wastewater treatment plant. We aim to improve their copper (Cu^{2+}) treatment system.

Project Description

The current copper treatment system uses a steel wool process that is:

- Inefficient at filtering high concentrations of copper
- Incapable of recycling copper
- Labor intensive as it requires hourly monitoring of copper concentration, pH, and fluid level in the tank
- Uneconomical as it consumes and disposes 1600 pounds of steel wool every month

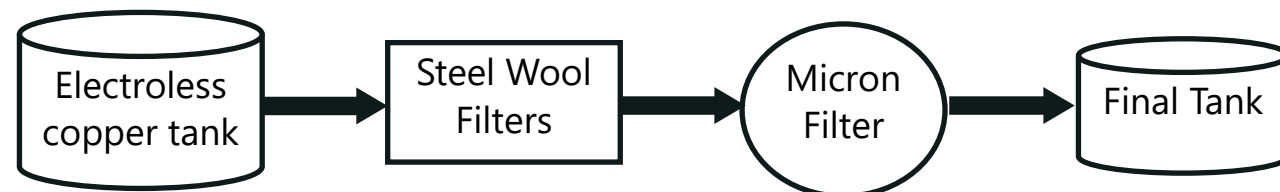


Figure 1. Current Steel Wool Copper Removal Unit Flow Diagram

Solutions

- Nanofiltration is a type of membrane filtration that uses a porous membrane to filter out the undesired material from the solvent, mainly water. This is accomplished using pressure to force the smaller particles through the membrane to form the permeate, or the material that flows through the membrane. (Fig.2)
- Ozonation is a chemical water treatment process based on the infusion of ozone into water. Ozone decomposes organics and inorganics, and increases coagulation effectiveness without altering pH of water. Moreover, it is capable of increasing biodegradability of EDTA. (Fig 3)

Team

Design Team of Chemical Engineers (from left to right):

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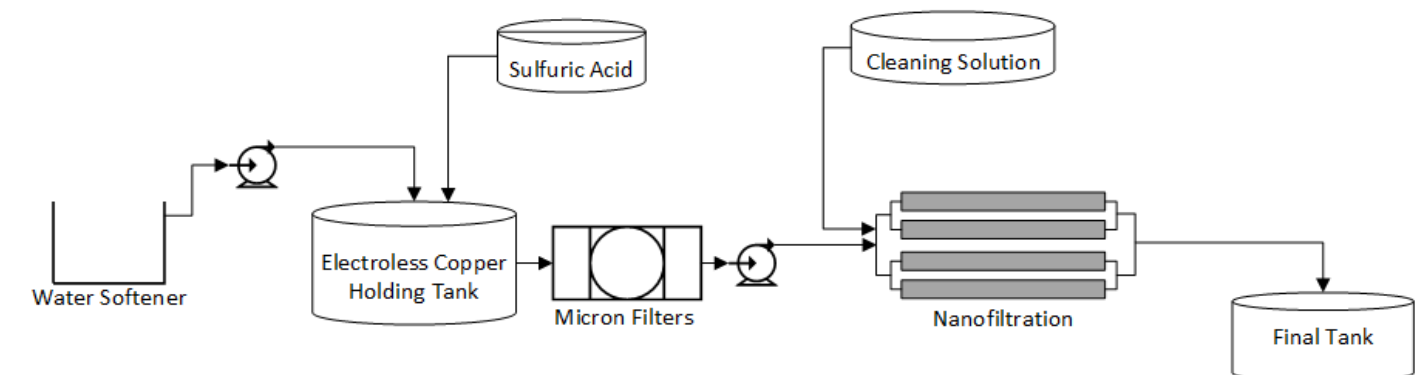


Figure 2. Nanofiltration Flow Diagram

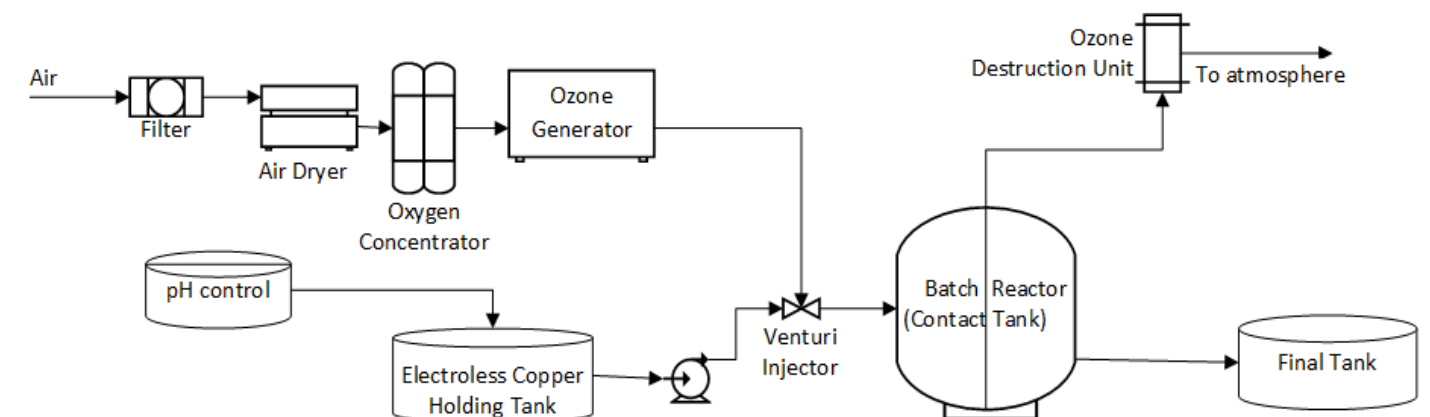


Figure 3. Ozonation Flow Diagram