system or component constructed from copper and may reduce its efficiency. Furthermore, free copper can lead to localized galvanic corrosion, as copper precipitates onto carbon steel.

[0006] As such, given the widespread use and importance of copper in various applications across many industries, inhibition of corrosion on surfaces including is relevant.

BRIEF SUMMARY

[0007] In some aspects, there is provided a corrosion inhibitor for a surface comprising copper or alloys thereof comprises a biochelant, a primary corrosion inhibitor, and a solvent. The biochelant may be a naturally-occurring molecule or derived from a monosaccharide or a polysaccharide. For example, the biochelant may comprise aldonic acid, uronic acid, aldaric acid, a salt thereof, a derivative thereof, or combinations thereof. The biochelant may comprise sodium gluconate, an oxidation product of sodium glucarate, one or more salts thereof, one or more derivatives thereof, or combinations thereof. The biochelant may further comprise n-keto acids and C_2-C_6 diacids in amounts of less than about 50 wt.%. The primary corrosion inhibitor may comprise a thiazole, a triazole or combinations thereof. For example, the primary corrosion inhibitor may comprise imidazole, pyrazole, 1,2,3-triazole, 1,2,4-triazole, tetrazole, oxazole, isoxazole, 1,2,4-oxadiazole, 1,3,4-oxadiazole, thiazole, 1,2,4-thiadiazole, mercaptobenzothiazole, mercaptobenzimidazole, butyl benzotriazole 1,3,4-thiadiazole, benzotriazole, tolytriazole, (2-pyrrole carbonyl) benzotriazole, (2-thienyl carbonyl)-benzotriazole, amino-1,2,4-triazole, diamino-1,2,4-triazole, mercapto-1H-1,2,4-triazole, methyl-2-phenyl-imidazole, amino-3-hydrazino-5-mercapto-1,2,4-triazole, phenyl-1-H-tetrazole, derivatives thereof, or combinations thereof. The solvent comprises ethylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, tripropylene glycol1,2-propanediol, 1,3-propanediol, 1,2-butanediol, 1,3-butanediol, 1,4-butanediol, 1,5-pentanediol, neopentyl glycol, 1,2-hexanediol, 1,6-hexanediol, 1,2-octanediol, 1,8-octanediol, 1,2-decanediol, 1,10-decanediol, glycerol, 2,2-dimethylolpropane, trimethylolethane, trimethylolpropane, pentaerythritol, dipentaerythritol, sorbitol, 1,2,4-butanetriol, 2,2,4-trimethyl-1,3-pentanediol, or combinations thereof. The solvent may comprise methanol, ethanol, propanol, isopropanol, n-butanol, isobutanol, pentanol, hexanol, heptanol, octanol, benzyl alcohol, phenol, cyclohexanol, and the like, and combinations thereof. The biochelant may be a mixture of aldaric, uronic acids. The

biochelant may be a mixture of aldaric acid, uronic acid, and their respective counter-cation. For example, the biochelant may comprise glucaric acid, gluconic acid, glucuronic acid, glucose oxidation products, and gluconic acid oxidation products. Additionally or alternatively, the biochelant may comprise sugar oxidation products comprising disaccharides, oxidized disaccharides, uronic acid, and aldaric acid. For example, the biochelant may comprise gluconic acid, glucaric acid, glucuronic acid, n-keto-acids and C2-C6 diacids. The counter-cation comprises an alkali earth metal of group 1 and group 2. For example, the counter-cation may comprise a rare earth metal. Additionally or alternatively, the counter-cation comprises ammonium.

[0008] Additionally or alternatively, in some aspects, a method for reducing corrosion in a system comprising copper, brass, other yellow metals, alloys thereof, or combinations thereof is provided. The method may comprise introducing an aqueous solution comprising the corrosion inhibitor described herein. The system may comprise industrial water. The industrial water may further comprise soluble copper, halides, or both.

BRIEF DESCRIPTION OF DRAWINGS

[0009] For a detailed description of the aspects of the disclosed processes and systems, reference will now be made to the accompanying drawings in which:

[0010] Figure 1 depicts a graph of conductivity as a function of sample composition for the samples from Example 1.

[0011] Figure 2 depicts a graph of conductivity as a function of sample composition for the samples from Example 2.

[0012] Figure 3 depicts a graph of conductivity as a function of sample composition for the samples from Example 3.

DETAILED DESCRIPTION

[0013] Disclosed herein are compositions and methods for reducing the corrosion of surfaces comprising copper, more particularly, copper and alloys thereof, for example, “yellow” metals such as brass or bronze, or combinations thereof, for instance, which may be exposed to aqueous system. Hereinafter, for simplicity copper, brass, other yellow metals, alloys thereof, or combinations thereof are collectively referred to as copper and copper-like metals and designated CUL.

[0014] In an aspect, the compositions disclosed herein may be effective to reduce the amount of deposition of a material onto a surface of a component and/or to chemically alter the surface, either of which may be detrimental to the component (e.g., equipment)