METAL SCAVENGING POLYMERS AND USES THEREOF

FIELD OF THE INVENTION

The field of the invention pertains to novel metal scavenging polymers and uses thereof.

BACKGROUND OF THE INVENTION

Metal scavenging for various mediums, such as process water and air have been a challenge for various industries, including heavy and light industry, such as power plants and mining operations. In addition, metal scavenging for process waters have been an object for municipal applications as well.

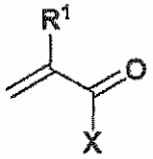
On-going investigations for improved metal scavenging technology have been desired by various industries. The present disclosure addresses various avenues for handling metals management in industrial and municipal processes. These chemistries could be potentially utilized for other various applications that require metal scavenging. .

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a general schematic of a portion of a wastewater treatment system.

SUMMARY ~~OF THE INVENTION~~

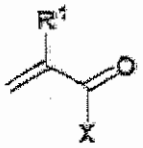
The present disclosure provides for a composition comprising a polymer derived from at least two monomers: acrylic-x and an alkylamine, wherein said acrylic-x has the following formula:



wherein X = OR, OH and salts thereof, or NHR^2 and wherein R^1 and R^2 is H or an alkyl or aryl group, wherein R is an alkyl or aryl group, wherein the molecular weight of said polymer is between 500 to 200,000, and wherein said polymer is modified to contain a functional group capable of scavenging one or more compositions containing one or more metals.

In one aspect, there is provided a method of removing one or more metals from a medium containing these metals which

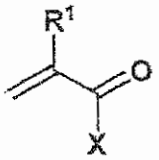
comprises the steps of: (a) treating said medium containing metals with a composition comprising a polymer derived from at least two monomers: acrylic-x and an alkylamine, and wherein said acrylic-x has the following formula:



wherein X = OH and salts thereof or NHR^2 and wherein R^1 and R^2 is H or an alkyl or aryl group, wherein the molecular weight of said

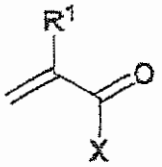
polymer is between 500 to 200,000, and wherein said polymer is modified to contain a functional group capable of scavenging one or more compositions containing one or more metals; and (b) collecting said treated metals.

The present disclosure also provides for a method of removing one or more metals from a medium containing these metals which comprises the steps of: (a) treating said medium containing metals with a composition comprising a polymer derived from at least two monomers: acrylic-x and an alkylamine, wherein said acrylic-x has the following formula:



wherein X = OR, OH and salts thereof, or NHR^2 and wherein R^1 and R^2 is H or an alkyl or aryl group, wherein the molecular weight of said polymer is between 500 to 200,000, and wherein said polymer is modified to contain a functional group capable of scavenging one or more compositions containing one or more metals; (b) and collecting said treated metals.

In another aspect, there is provided a method of removing one or more metals from a medium containing these metals which comprises the steps of: (a) treating said medium containing metals with a composition comprising a polymer derived from at least two monomers: acrylic-x and an alkylamine, wherein said acrylic-x has the following formula:

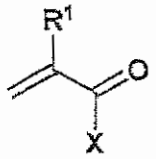


wherein X = OR and wherein R is an alkyl or aryl group, wherein R^1 is H or an alkyl or an aryl group, and wherein the molecular weight of said polymer is between 1,000 to 16,000, and wherein said polymer is modified to contain a functional group capable of scavenging one or more compositions containing one or more metals; and collecting said treated metals.

DETAILED DESCRIPTION OF THE INVENTION

A. Compositions

The present disclosure provides for a composition comprising a polymer derived from at least two monomers: acrylic-x and an alkylamine, wherein said acrylic-x has the following formula:



wherein X = OR, OH and salts thereof, or NHR^2 and wherein R^1 and R^2 is H or an alkyl or aryl group, wherein R is an alkyl or aryl group, wherein the molecular weight of said polymer is between 500 to 200,000, and wherein said polymer is modified to contain a functional group capable of scavenging one or more compositions containing one or more metals.

The metals can include zero valent, monovalent, and multivalent metals. The metals may or may not be ligated by organic or inorganic compounds. Also, the metals can be radioactive and nonradioactive. Examples include, but are not limited to, transition metals and heavy metals. Specific metals can include, but are not limited to: copper, nickel, zinc, lead, mercury, cadmium, silver, iron, manganese, palladium, platinum, strontium, selenium, arsenic, cobalt and gold.

The molecular weight of the polymers can vary. For example, the target species/application for the polymers can be one consideration. Another factor can be monomer selection. Molecular weight can be calculated by various means known to those of ordinary skill