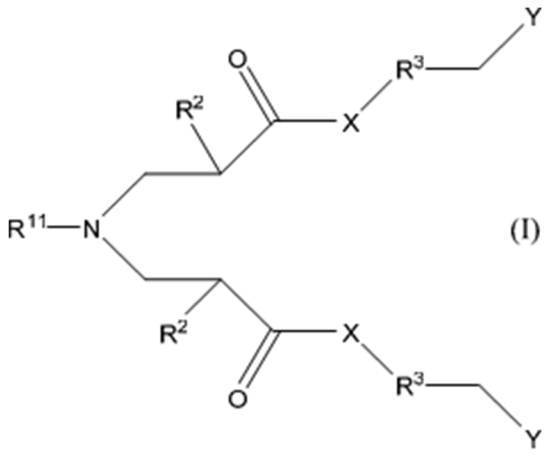
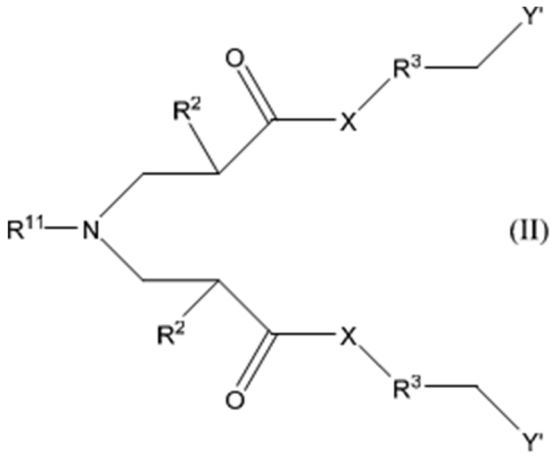
What is claimed is:

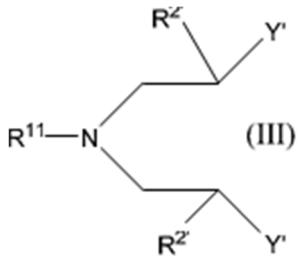
1. A method of for inhibiting corrosion at a surface in a water system comprising:

providing a corrosion control composition or a use solution of the corrosion control composition into a water system to generate a treated water system or onto to a surface of the water system,

wherein the corrosion control composition comprises one or more compounds according to one of Formula I, Formula II, Formula III and one or more additional corrosion control composition agents,







wherein:

X is NH or O;

R^{11} is R^1 or R^1-Z-$(CH_2)_m$-;

R^1 is an unsubstituted or substituted, linear or branched C_5-C_{30} alkyl, cyclic alkyl, alkenyl, or alkynyl group;

Z is NH or O;

R^2 is H, CH_3, or an unsubstituted, linear or branched C_2-C_{10} alkyl, alkenyl, or alkynyl group;

m is an integer of 1 to 4;

R^3 is absent or an unsubstituted, linear C_1-C_{30} alkylene group;

Y is -$NR_4R_5R_6^{(+)}$;

Y' is -COOH, -SO_3H, -PO_3H, -OSO_3H, -OPO_3H, or a salt thereof; and

R^4, R^5, and R^6 are independently a C_1-C_{10} alkyl group;

$R^{2'}$ is H, CH_3, or an unsubstituted or substituted, linear or branched C_1-C_{10} alkyl, alkenyl, alkynyl group, -COOH, -CH_2COOH, Y', or –$(CH_2)_m$-Y' and

wherein the corrosion control composition mitigates corrosion on the surface in the water system.

2. The method according to claim 1, wherein Y is – $NR^4R^5R^{6(+)}$, $N(CH_3)_3^+$, or $N(CH_3)_2R_6^+$, and wherein R^6 is a C_2-C_{12} alkyl. aryl, or is -CH_2-C_6H_6.

3. The method according to any one of claims 1-2, wherein R^3 is CH_2, CH_2CH_2, or $C(CH_3)_2$, or an unsubstituted and linear C_2-C_{10} alkylene group.

4. The method according to any one of claims 1-3, wherein R^{11} is a C_6-C_{20} alkenyl group with at least one *trans* or *cis* double bond.

5. The method according to any one of claims 1-4, wherein the corrosion control composition agent is water, an organic solvent, a surfactant, one or more additional

corrosion inhibitors, a scale inhibitor, gas hydrate inhibitor, pH modifier, an emulsion breaker, reverse emulsion breaker, a fouling control agent, coagulant/flocculant agent, an emulsifier, a water clarifier, a dispersant, antioxidant, polymer degradation prevention agent, permeability modifier, foaming agent, antifoaming agent, emulsifying agent, scavenger agent for CO_2, and/or O_2, gelling agent, lubricant, friction reducing agent, salt, or any mixture thereof.

6. The method according to any one of claims 1-5, wherein the corrosion control composition agent is a biocide, wherein the biocide is chlorine, hypochlorite, ClO_2, bromine, ozone, hydrogen peroxide, peracetic acid, peroxysulphate, peroxycarboxylic acid composition, glutaraldehyde, dibromonitrilopropionamide, isothiazolone, terbutylazine, polymeric biguanide, methylene bisthiocyanate, tetrakis hydroxymethyl phosphonium sulphate, or any combination thereof.

7. The method according to any one of claims 1-5, wherein the corrosion control composition agent is an acid and wherein the corrosion control composition comprises from about 1 wt-% to about 20 wt-% of the acid, wherein the acid is hydrochloric acid, hydrofluoric acid, citric acid, formic acid, acetic acid, or a mixture thereof.

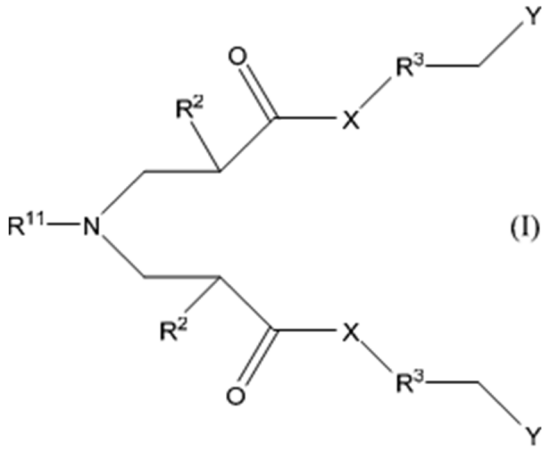
8. The method according to any one of claims 1-7, wherein the corrosion control composition is a liquid, gel, or a mixture comprising liquid/gel and solid, and wherein the corrosion control composition or a use solution thereof has a pH of from about 1 to about 11.

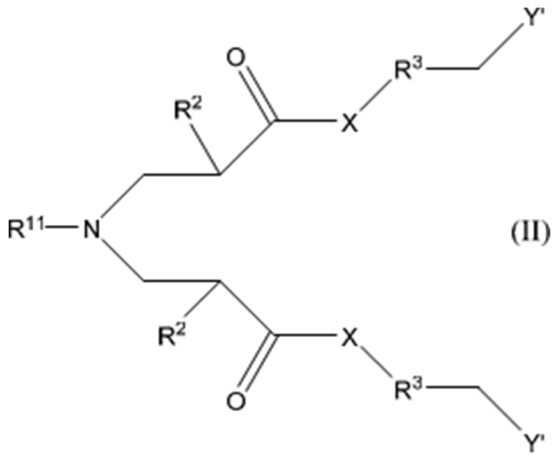
9. The method according to any one of claims 1-8, wherein the corrosion control composition comprises from about 10 wt-% to about 80 wt-% of the compound and has a concentration of from about 1 ppm to about 1000 ppm in the treated water system.

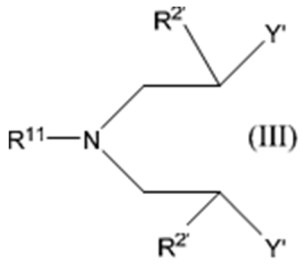
10. The method according to any one of claims 1-9, wherein the water system is a cooling water system, boiler water system, water system in oil and gas operations, in a petroleum well, downhole formation, geothermal well, mineral washing, flotation and benefaction, papermaking, gas scrubber, air washer, continuous casting processes in the metallurgical industry, air conditioning and refrigeration, water reclamation, water purification, membrane filtration, food processing,

clarifiers, municipal sewage treatment, municipal water treatment, or potable water system, and wherein the water system comprises fresh water, recycled water, salt water, surface water, produced water, oil, hydrocarbon, solid, or mixture thereof.

11. A corrosion control composition comprising one or more compounds according to one of Formula **I**, Formula **II**, and Formula **III** and one or more additional corrosion control composition agents,







wherein:

X is NH or O;

R^{11} is R^1 or R^1-Z-$(CH_2)_m$-;

R^1 is an unsubstituted or substituted, linear or branched C_5-C_{30} alkyl, cyclic alkyl, alkenyl, or alkynyl group;

Z is NH or O;

R^2 is H, CH_3, or an unsubstituted, linear or branched C_2-C_{10} alkyl, alkenyl, or alkynyl group;

m is an integer of 1 to 4;

R^3 is absent or an unsubstituted, linear C_1-C_{30} alkylene group;

Y is -$NR_4R_5R_6^{(+)}$;

Y' is -COOH, -SO_3H, -PO_3H, -OSO_3H, -OPO_3H, or a salt thereof;

R^4, R^5, and R^6 are independently a C_1-C_{10} alkyl group;

$R^{2'}$ is H, CH_3, or an unsubstituted or substituted, linear or branched C_1-C_{10} alkyl, alkenyl, alkynyl group, -COOH, -CH_2COOH, Y', or –$(CH_2)_m$-Y', and

wherein the corrosion control composition mitigates corrosion on the surface in the water system.