

Title: METHOD OF MITIGATING CORROSION RATE OF OILFIELD TUBULAR GOODS

Abstract: Acid-soluble cupric acetate may be used in conjunction with potassium iodide to generate cuprous iodide (CuI) as an acid corrosion inhibition aid. A suitable corrosion inhibitor together with the aid protects steel surfaces in an acid environment, for instance, while acid fracturing or matrix acidizing subterranean formations. Cupric acetate monohydrate may be used with an alkali metal iodide salt such as potassium iodide or sodium iodide to generate cuprous iodide *in situ*. In aqueous acid solutions. Use of cupric acetate provides a somewhat delayed reaction rate with potassium iodide to generate the desired product, cuprous iodide, which has very low solubility in acid systems. The method includes delayed and *in situ* production of cuprous iodide for enhancing performance of commercially available corrosion inhibitors, commonly referred to as intensifying the effect of the corrosion inhibitor (corrosion inhibitor intensifier or simply an intensifier).

CLAIMS

What is claimed is:

1. An aqueous acidic composition comprising:
water;
an acid;
a corrosion inhibitor; and
a mixture to generate a corrosion inhibitor aid *in situ*, the mixture comprising:
a copper salt; and
an alkali metal iodide salt selected from the group
consisting of potassium iodide, sodium iodide, and
combinations thereof.
2. The aqueous acidic composition of claim 1 where the copper salt is selected from the group consisting of cupric acetate, copper (II) chloride, cupric formate, cupric nitrate, copper hydroxide, copper sulfate and combinations thereof.
3. The aqueous acidic composition of claim 1 or 2 where the copper salt and the alkali metal iodide salt are present in approximately a 1:1 stoichiometric ratio of copper to iodine.
4. The aqueous acidic composition of claim 3 where the corrosion inhibitor aid is present in the aqueous acidic composition in an amount from about 0.1 to 5 wt%.
5. The aqueous acidic composition of claim 3 where the acid is selected from the group consisting of:

inorganic acids selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, hydrofluoric acid, hydrobromic acid, boric acid,
organic acids selected from the group consisting of acetic acid, formic acid, lactic acid, citric acid, oxalic acid, sulfonic acids, glycolic acid, chloroacetic acid, hydroxyacetic acid and combinations thereof.

6. The aqueous acidic composition of claim 3 where the corrosion inhibitor is selected from the group consisting of acetylenic alcohols, Mannich reaction products, quaternary amine compounds, cinnamaldehyde, and combinations thereof.
7. The aqueous acidic composition of claim 3 where the corrosion inhibitor aid is cuprous iodide (CuI).
8. A method of mitigating metal corrosion comprising:
creating an aqueous acidic composition comprising:
water;
an acid;
a corrosion inhibitor; and
a mixture to generate a corrosion inhibitor aid *in situ*, the mixture comprising:
a copper salt; and
an alkali metal iodide salt selected from the group consisting of potassium iodide, sodium iodide and combinations thereof;
during or after creation of the aqueous acidic composition, contacting the aqueous acidic composition with a metal; and
forming cuprous iodide (CuI) from the copper salt and the alkali metal iodide salt in the aqueous acidic composition.

9. The method of claim 8 where the copper salt is selected from the group consisting of cupric acetate, copper (II) chloride, cupric formate, cupric nitrate, copper hydroxide, copper sulfate and combinations thereof.

10. The method of claim 8 or 9 where the copper salt and the alkali metal iodide salt are present in the aqueous acidic composition in approximately a 1:1 stoichiometric ratio of copper to iodine.

11. The method of claim 10 where the corrosion inhibitor aid is present in the aqueous acidic composition in an amount from 0.1 to 5 wt%.

12. The method of claim 10 where the acid is selected from the group consisting of:

inorganic acids selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, hydrofluoric acid, hydrobromic acid, boric acid,
organic acids selected from the group consisting of acetic acid, formic acid, lactic acid, citric acid, oxalic acid, sulfonic acids, glycolic acid, chloroacetic acid, hydroxyacetic acid and combinations thereof.

13. The method of claim 10 where the corrosion inhibitor is selected from the group consisting of acetylenic alcohols, Mannich reaction products, quaternary amine compounds, cinnamaldehyde, and combinations thereof.

14. The method of claim 10 where the metal is within a subterranean well and the method further comprises introducing the aqueous acidic composition into the well.

15. A method of acidizing a subterranean formation comprising:
creating an aqueous acidic composition comprising:
water;

an acid;

a corrosion inhibitor; and

a mixture to generate a corrosion inhibitor aid *in situ*, the mixture comprising:

a copper salt; and

an alkali metal iodide salt selected from the group consisting of potassium iodide, sodium iodide and combinations thereof;

during or after creation of the aqueous acidic composition, introducing the aqueous acidic composition into the subterranean formation through a wellbore; and

forming cuprous iodide (CuI) from the copper salt and the alkali metal iodide salt in the aqueous acidic composition.

16. The method of claim 15 where the copper salt is selected from the group consisting of cupric acetate, copper (II) chloride, cupric formate, cupric nitrate, copper hydroxide, copper sulfate and combinations thereof.

17. The method of claim 15 or 16 where the copper salt and the alkali metal iodide salt are present in the aqueous acidic composition in approximately a 1:1 stoichiometric ratio of copper to iodine.

18. The method of claim 17 where the corrosion inhibitor aid is present in the aqueous acidic composition in an amount from 0.1 to 5 wt%.

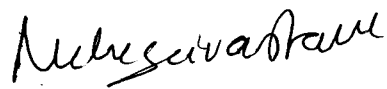
19. The method of claim 17 where the acid is selected from the group consisting of:

inorganic acids selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, hydrofluoric acid, hydrobromic acid, boric acid,

organic acids selected from the group consisting of acetic acid, formic acid, lactic acid, citric acid, oxalic acid, sulfonic acids, glycolic acid, chloroacetic acid, hydroxyacetic acid and combinations thereof.

20. The method of claim 17 where the corrosion inhibitor is selected from the group consisting of acetylenic alcohols, Mannich reaction products, quaternary amine compounds, cinnamaldehyde, and combinations thereof.

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