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We claim:

1. A process for removing permanganate reducing compounds (PRC's) from a crude acetic acid composition, the process comprising the steps of:

separating the crude acetic acid composition in a light ends column into an overhead vapor stream comprising halogen promoter, water, acetic acid, methyl acetate and at least one PRC, and an acetic acid product stream;

condensing and biphasically separating the overhead vapor stream into a heavy phase and a light phase;

separating the light phase in a distillation column into an overhead PRC stream and a bottoms stream, wherein the overhead PRC stream is enriched with PRC with respect to the bottoms stream;

condensing the overhead PRC stream and extracting in a first extractor the condensed overhead PRC stream to obtain a first aqueous stream comprising water, halogen promoter and at least one PRC, and a first raffinate comprising methyl acetate; and

extracting in a second extractor the first aqueous stream to obtain a second raffinate comprising water and at least one PRC, and an extract stream comprising halogen promoter, and a second extractant.

2. The process of claim 1, wherein the first extractant and the second extractant are different.

3. The process of claim 1, wherein the second extractant comprises a C_6 to C_{16} alkane.

4. The process of claim 1, wherein the second extractant comprises a C_8 to C_{12} alkane.

5. The process of claim 1, wherein the second extractant comprises decane, dodecane, or mixtures thereof.

6. The process of claim 1, wherein the second raffinate comprises less than 500 wppm of halogen promoter.

7. The process of claim 1, wherein the second raffinate comprises less than 200 wppm of halogen promoter.

8. The process of claim 1, wherein the second raffinate comprises less than 100 wppm of halogen promoter.

9. The process of claim 1, wherein at least 70 % of the halogen promoter in the first aqueous stream is extracted into the extract stream.

10. The process of claim 1, wherein at least 85 % of the halogen promoter in the first aqueous stream is extracted into the extract stream.

11. The process of claim 1, wherein at least 95 % of the halogen promoter in the first aqueous stream is extracted into the extract stream.

12. The process of claim 1, wherein the process further comprises:

separating the extract stream in a recovery column to produce a residue comprising the second extractant, and a distillate comprising the halogen promoter; and

introducing at least a portion of the distillate to a carbonylation reactor for producing the crude acetic acid composition.

13. The process of claim 12, wherein the distillate further comprises at least one alkyl iodide selected from the group consisting of ethyl iodide, propyl iodide, butyl iodide, pentyl iodide, hexyl iodide, and isomers and mixtures thereof.

14. The process of claim 13, wherein the process further comprises:

directing a side stream from the recovery column to a holding vessel, wherein the side stream comprises the halogen promoter and the at least one C_{2+} alkyl halides.

15. The process of claim 14, wherein the process further comprises:

removing the halogen promoter from at least a portion of the side stream; and directing the halogen promoter to a process for producing acetic acid.

16. A process for removing permanganate reducing compounds (PRC's) from a crude acetic acid composition, the process comprising the steps of:

separating the crude acetic acid composition in a distillation column to form a condensed heavy phase and a condensed light phase comprising halogen promoter, C_{2+} alkyl halide and at least one PRC;

separating the condensed light phase into an overhead PRC stream and a bottoms stream;

condensing the overhead PRC stream and extracting in a first extractor the condensed overhead PRC stream to obtain a first aqueous stream comprising halogen promoter, C_{2+} alkyl halide and at least one PRC, and a first raffinate comprising methyl acetate; and

extracting in a second extractor the first aqueous stream to obtain a second raffinate comprising at least one PRC, and an extract stream comprising halogen promoter and C_{2+} alkyl halide, wherein at least 70% of the halogen promoter and C_{2+} alkyl halide present in the first aqueous stream is extracted into the extract stream.

17. The process of claim 16, wherein the extracting utilizes a hydrophobic extractant comprising a C_6 to C_{16} alkane.

18. The process of claim 16, wherein the process further comprises:

separating the extract stream to produce a distillate comprising halogen promoter and a residue comprising extractant; and

recycling the distillate to a carbonylation reactor for producing the crude acetic acid composition.

19. The process of claim 16, wherein an overall C_{2+} alkyl halide and halogen promoter recovery from the crude acetic acid composition is at least 70 wt.%.

20. The process of claim 16, wherein the extract stream comprises less than 10 wt.% PRC and greater than a minor amount of halogen promoter and C_{2+} alkyl halide

21. The process of claim 16, wherein the second raffinate comprises less than 10 wt.% halogen promoter and C_{2+} alkyl halide and greater than a minor amount of PRC.

22. A process for removing permanganate reducing compounds (PRC's) from a crude acetic acid composition, the process comprising the steps of:

providing a carbonylation process stream comprising 5 to 40 wt.% of at least one PRC and 0.7 to 10 wt.% halogen promoter;

separating via extraction the carbonylation process stream to form an extract stream of at least one PRC and halogen promoter and a raffinate stream;

separating the extract stream to form a distillate stream comprising halogen promoter and a residue stream comprising extractant.

23. The process of claim 22, wherein the extraction utilizes a hydrophobic extractant comprising a C_6 to C_{16} alkane.

24. The process of claim 22, wherein the process further comprises:

separating the raffinate stream to produce a distillate comprising halogen promoter and a residue comprising extractant; and

recycling the distillate to a carbonylation reactor.

25. The process of claim 22, wherein the carbonylation process stream comprises 7 to 35 wt.% of at least one PRC and 0.75 to 5 wt.% halogen promoter and wherein the extract stream comprises 9 to 30 wt.% of at least one PRC and 0.02 to 2.0 wt.% halogen promoter.

26. The process of claim 22, wherein the carbonylation process stream comprises 10 to 30 wt.% of at least one PRC and 0.80 to 2 wt.% halogen promoter and wherein the extract stream comprises 11 to 28 wt.% of at least one PRC and 0.04 to 1 wt.% halogen promoter.

1. A process for removing permanganate reducing compounds (PRC's) from a crude acetic acid composition, the process comprising the steps of:

separating the crude acetic acid composition in a light ends column into an overhead vapor stream comprising halogen promoter, water, acetic acid, methyl acetate and at least one PRC, and an acetic acid product stream;

condensing and biphasically separating the overhead vapor stream into a heavy phase and a light phase;

separating the light phase in a distillation column into an overhead PRC stream and a bottoms stream, wherein the overhead PRC stream is enriched with PRC with respect to the bottoms stream;

condensing the overhead PRC stream and extracting with a first extractant in a first extractor the condensed overhead PRC stream to obtain a first aqueous stream comprising water, halogen promoter and at least one PRC, and a first raffinate comprising methyl acetate;

and

extracting with a second extractant in a second extractor the first aqueous stream to obtain a second raffinate comprising water and at least one PRC, and an extract stream comprising halogen promoter, and the second extractant;

wherein the second extractant comprises a C_6 to C_{16} alkane.

2. The process of claim **1**, wherein the first extractant and the second extractant are different.

3. The process of claim **1**, wherein the second extractant comprises a C_8 to C_{12} alkane.

4. The process of claim **1**, wherein the second extractant comprises decane, dodecane, or mixtures thereof.

5. The process of claim **1,** wherein the second raffinate comprises less than 500 wppm of halogen promoter.

6. The process of claim **1,** wherein the second raffinate comprises less than 200 wppm of halogen promoter.

7. The process of claim **1,** wherein the second raffinate comprises less than 100 wppm of halogen promoter.

8. The process of claim **1,** wherein at least 70% of the halogen promoter in the first aqueous stream is extracted into the extract stream.

9. The process of claim **1,** wherein at least 85% of the halogen promoter in the first aqueous stream is extracted into the extract stream.

10. The process of claim **1,** wherein at least 95% of the halogen promoter in the first aqueous stream is extracted into the extract stream.

11. The process of claim **1,** wherein the process further comprises:

separating the extract stream in a recovery column to produce a residue comprising the second extractant, and a distillate comprising the halogen promoter; and

introducing at least a portion of the distillate to a carbonylation reactor for producing the crude acetic acid composition.

12. The process of claim 11, wherein the distillate further comprises at least one alkyl iodide selected from the group consisting of ethyl iodide, propyl iodide, butyl iodide, pentyl iodide, hexyl iodide, and isomers and mixtures thereof.

13. The process of claim 12, wherein the process further comprises:

directing a side stream from the recovery column to a holding vessel, wherein

the side stream comprises the halogen promoter and the at least one C_{2+} alkyl halides.

14. The process of claim 13, wherein the process further comprises:

removing the halogen promoter from at least a portion of the side stream; and directing the halogen promoter to a process for producing acetic acid.

15. A process for removing permanganate reducing compounds (PRC's) from a crude acetic acid composition, the process comprising the steps of:

separating the crude acetic acid composition in a distillation column to form a condensed heavy phase and a condensed light phase comprising halogen promoter, C_{2+} alkyl halide and at least one PRC;

separating the condensed light phase into an overhead PRC stream and a bottoms stream;

condensing the overhead PRC stream and extracting in a first extractor with a first extractant the condensed overhead PRC stream to obtain a first aqueous stream comprising halogen promoter, C_{2+} alkyl halide and at least one PRC, and a first raffinate comprising methyl acetate; and

extracting in a second extractor with a second extractant the first aqueous stream to obtain a second raffinate comprising at least one PRC, and an extract stream comprising halogen promoter and C_{2+} alkyl halide, wherein at least 70% of the halogen promoter and C_{2+} alkyl halide present in the first aqueous stream is extracted into the extract stream; wherein the second extractant comprises a C_6 to C_{16} alkane.

16. The process of claim 15, wherein the process further comprises:

separating the extract stream to produce a distillate comprising halogen promoter and a residue comprising extractant; and

recycling the distillate to a carbonylation reactor for producing the crude acetic acid composition.

17. The process of claim 15, wherein an overall C_{2+} alkyl halide and halogen promoter recovery from the crude acetic acid composition is at least 70 wt.%.

18. The process of claim 15, wherein the extract stream comprises less than 10 wt.% PRC and greater than a minor amount of halogen promoter and C_{2+} alkyl halide.

19. The process of claim 15, wherein the second raffinate comprises less than 10 wt.% halogen promoter and C_{2+} alkyl halide and greater than a minor amount of PRC.