CLAIMS

1. A method for producing acetic acid comprising:

(A) reacting methanol, methyl acetate, or dimethyl ether with carbon monoxide to form acetic acid at a pressure of about 1350-8500 kPa, wherein the reaction takes place in a reaction mixture further comprising a rhodium catalyst, an iodide source, and a phosphine oxide$_{(C\leq24)}$ or substituted phosphine oxide$_{(C\leq24),}$ wherein the iodide concentration is from 1,000 parts per million to 60,000 parts per million; and

(B) purifying the reaction mixture using an ion exchange resin comprising:

(i) either one of steps (1) and (2):

(1) loading silver(I) ions onto an ion exchange resin until the silver(I) loaded ion exchange resin comprises 15 to 40 wt% of silver(I) ions; or

(2) obtaining a silver(I) loaded ion exchange comprising 15 to 40 wt% of silver(I) ions; and

(ii) obtaining a iodide containing acetic acid product stream comprising an iodide concentration of 50-100 parts per billion; and

(iii) contacting the product stream with the silver(I) loaded ion exchange resin to reduce the concentration of iodide in a final product stream.

2. The method of claim 1, wherein the ion exchange resin is loaded with 18 wt% to 40 wt% of silver(I) ions.

3. The method of claim 2, wherein the ion exchange resin is loaded with 20 wt% to 40 wt% of silver(I) ions.

4. The method of claim 1, wherein the iodide source is methyl iodide or hexyl iodide.

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5. The method of claim 1, wherein the iodide source is an inorganic iodide.

6. The method of claim 5, wherein the inorganic iodide is hydrogen iodide, hydroiodic acid, or lithium iodide.

7. The method of claim 1, further comprising distilling the product mixture to remove the rhodium catalyst and the phosphine oxide$_{(C\leq24)}$ or substituted phosphine oxide$_{(C\leq24)}$.

8. The method of claim 1, wherein the reaction mixture comprises transition metals selected from the group consisting of Fe, Ni, Cr, Mo and combinations thereof at a concentration of less than 5 parts per thousand.

9. The method of claim 1, wherein the phosphine oxide$_{(C\leq24)}$ or the substituted phosphine oxide$_{(C\leq24)}$ is triphenylphosphine oxide.

10. The method of claim 1, wherein the concentration of iodide in the final product stream is reduced to less than 10 parts per billion.

11. A method for reducing the iodide concentration in acetic acid comprising:

(A) obtaining an acetic acid mixture produced in accordance with claim 1 with an iodide concentration of greater than 50 parts per billion; and

(B) contacting the iodide containing acetic acid mixture with the silver(I) loaded ion exchange resin, wherein the silver(I) loaded ion exchange resin is loaded with from 15 wt% to 40 wt% silver(I) under conditions sufficient to reduce the iodide concentration in the acetic acid mixture to a final iodide concentration less than 10 parts per billion.

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