We claim:

1. A process for producing acetic acid, comprising the steps of:

reacting carbon monoxide with at least one reactant in a first reactor containing a reaction medium to produce a reaction solution comprising acetic acid,

wherein the at least one reactant is selected from the group consisting of methanol, methyl acetate, methyl formate, dimethyl ether and mixtures thereof and

wherein the reaction medium comprises water, acetic acid, methyl iodide, and a catalyst;

introducing at least a portion of the reaction solution to a second reactor to produce a first heat recovery stream; and

introducing the first heat recovery stream to the first reactor.

2. The process of claim 1, further comprising the step of:

passing the first heat recovery stream through a steam generator.

3. The process of any one of claims 1 or 2, further comprising the steps of:

separating a portion of the reaction solution;

introducing the separated portion to a heat exchanger to produce a second heat recovery stream; and

introducing the second heat recovery stream to the first reactor.

4. (Canceled)

5. (Amended) The process of any one of claims 1-3, wherein the type of second reactor is selected from the group consisting of a pipe reactor, a tubular reactor, a continuous stirred-tank reactor and a fluidized bed reactor.

6. (Amended) The process of any one of claims 1-4, wherein 20% to 100% of the reaction solution is introduced to the second reactor.

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7. (Amended) The process of any one of claims 1-5, wherein the second reactor is operated at a temperature higher than the first reactor.

8. (Amended) The process of any one of claims 1-6, wherein the at least a portion of the reaction solution has a residence time in the second reactor from 0.2 seconds to 120 seconds.

9. (Amended) The process of any one of claims 1-7, further comprising the step of:

feeding carbon monoxide to the second reactor in an amount from 0.1% to 10% based on the total carbon monoxide fed to the first reactor.

10. (Amended) The process of any one of claims 1-8, further comprising the step of:

feeding the at least one reactant to the second reactor in an amount from 0.1% to 10% based on the total reactants fed to the first reactor.

11. (Amended) The process of any one of claims 1-9, wherein the first heat recovery stream comprises acetic acid, methyl acetate, methanol, water, methyl iodide, iodide salt, or mixtures thereof.

12. (Amended) The process of any one of claims 1-10, wherein the residual catalyst from the first reactor catalyzes the reaction in the second reactor.

13. (Canceled)

14. (Amended) A system for producing acetic acid, comprising:

a first reactor for reacting carbon monoxide, at least one reactant and a reaction medium to produce a first reaction solution comprising acetic acid;

a separator for separating the first reaction solution into a plurality of derivative heat recovery streams; and

a second reactor for reacting carbon monoxide, the at least one reactant and the reaction medium to produce a second reaction solution comprising acetic acid and for recovering steam and/or heat from at least one of the heat recovery streams,

wherein the at least one reactant is selected from the group consisting of methanol, methyl acetate, methyl formate, dimethyl ether and mixtures thereof, and

wherein the reaction medium comprises water, acetic acid, methyl iodide, and a catalyst, and

wherein the second reactor is a pump around reactor or extended reactor positioned in a side stream from the first reactor.

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The invention claimed is:

1. A process for producing acetic acid, comprising the steps of:

reacting carbon monoxide with at least one reactant in a first reactor containing a reaction medium to produce a reaction solution comprising acetic acid,

wherein the at least one reactant is selected from the group consisting of methanol, methyl acetate, methyl formate, dimethyl ether and mixtures thereof and

wherein the reaction medium comprises water, acetic acid, methyl iodide, and a catalyst;

introducing at least a portion of the reaction solution to a second reactor and recovering the heat from the second reactor to produce a first heat recovery stream; and

introducing the first heat recovery stream to the first reactor.

2. The process of claim 1, further comprising the steps of: passing the first heat recovery stream through a steam generator.

3. The process of claim 2, wherein the steam produced by the steam generator has a pressure of from 4 to 13 barg.

4. The process of claim 1, further comprising the steps of:

separating a portion of the reaction solution;

introducing the separated portion to a heat exchanger to produce a second heat recovery stream; and

introducing the second heat recovery stream to the first reactor.

5. The process of claim 1, wherein the second reactor is a pipe reactor.

6. The process of claim 1, wherein the second reactor is a tubular reactor.

7. The process of claim 1, wherein the second reactor is a fluidized bed.

8. The process of claim 1, wherein the second reactor is a continuous stirred-tank reactor.

9. The process of claim 1, wherein the second reactor is operated at a temperature from 150°C. to 250°C.

10. The process of claim 1, wherein 20% to 100% of the reaction solution is introduced to the second reactor.

11. The process of claim 1, wherein the second reactor is operated at a temperature higher than the first reactor.

12. The process of claim 1, wherein the second reactor is operated at a pressure from 15 atmospheres to 50 atmospheres.

13. The process of claim 1, wherein the at least a portion of the reaction solution has a residence time in the second reactor of from 0.2 seconds to 120 seconds.

14. The process of claim 1, further comprising the step of:

feeding carbon monoxide to the second reactor in an amount of from 0.1% to 10% based on the total carbon monoxide fed to the first reactor.

15. The process of claim 1, further comprising the step of:

feeding the at least one reactant to the second reactor in an amount of from 0.1% to 10% based on the total carbon monoxide fed to the first reactor.

16. The process of claim 1, wherein the first heat recovery stream comprises acetic acid.

17. The process of claim 1, wherein the first heat recovery stream comprises one or more of methyl acetate, methanol, water, methyl iodide and iodide salt.

18. The process of claim 1, wherein the residual catalyst from the first reactor catalyzes the reaction in the second reactor.

19. A process for producing acetic acid, comprising the steps of:

reacting carbon monoxide with at least one reactant in a first reactor containing a reaction medium to produce a reaction solution comprising acetic acid,

wherein the at least one reactant is selected from the group consisting of methanol, methyl acetate, methyl formate, dimethyl ether and mixtures thereof and

wherein the reaction medium comprises water, acetic acid, methyl iodide, and a catalyst;

introducing at least a portion of the reaction solution to a second reactor and recovering the heat from the second reactor to produce a first heat recovery stream; and

passing the first heat recovery stream through a steam generator.

20. The process of claim 19, wherein the steam produced by the steam generator has a pressure of from 4 to 13 barg.