

CLAIMS

What is claimed is:

1. A method for the production of acetic acid comprising:
 - (A) reacting,
 - (i) methanol,
 - (ii) carbon monoxide, and
 - (iii) water,in a carbonylation reactor in the presence of a carbonylation catalyst to produce a reactor mixture;
 - (B) measuring an initial value for a reference component by Raman spectroscopic analysis with an uncoated probe or flow-through cell in contact with the reactor mixture;
 - (C) measuring a value for the reference component and measuring the concentration of one or more components of interest in the reactor mixture by Raman spectroscopic analysis;
 - (D) determining an Adjustment Ratio by dividing the initial value for the reference component by the value for the reference component;
 - (E) calculating an Adjusted Value for the concentration of the component(s) of interest by multiplying the concentration of the component(s) of interest by the Adjustment Ratio; and
 - (F) modifying at least one process condition in the carbonylation reactor or a separation unit, based upon the Adjusted Value.
2. The method of claim 1, wherein the ingredients comprise methyl acetate.
3. The method of claim 1, wherein the ingredients comprise a catalyst stabilizer.
4. The method of claim 3, wherein the catalyst stabilizer is a pentavalent Group VA oxide.
5. The method of claim 4, wherein the catalyst stabilizer is a phosphine oxide.
6. The method of claim 1, wherein the ingredients comprise a catalyst promoter.
7. The method of claim 6, wherein the catalyst promoter is methyl iodide.
8. The method of claim 7, wherein the reactor mixture comprises:
 - (A) a carbonylation catalyst;
 - (B) methanol;
 - (C) methyl acetate;

- (D) water;
 - (E) carbon monoxide;
 - (F) carbon dioxide; and
 - (G) acetic acid.
9. The method of claim 6, wherein the ingredients comprise a phosphine oxide.
10. The method of claim 1, wherein the ingredients comprise hydrogen iodide.
11. The method of claim 10, wherein the reactor mixture comprises:
- (A) a carbonylation catalyst;
 - (B) methanol;
 - (C) methyl acetate;
 - (D) water;
 - (E) carbon monoxide;
 - (F) carbon dioxide;
 - (G) methyl iodide; and
 - (H) acetic acid.
12. The method of claim 11, wherein the ingredients comprise a phosphine oxide.
13. The method of claim 1, wherein the Adjustment Ratio is less than 5.
14. The method of claim 1, wherein the process condition comprises:
- (A) the temperature of the carbonylation reactor;
 - (B) the pressure of the carbonylation reactor;
 - (C) the temperature of a separation unit;
 - (D) the pressure of a separation unit;
 - (E) the flow rate of an ingredient;
 - (F) the flow rate of an exit stream;
 - (G) the concentration of a component; and
 - (H) the selection of a component.
15. The method of claim 1, wherein the reference component is the Total Signal Strength.
16. The method of claim 1, wherein the reference component is glacial acetic acid.
17. The method of claim 5, wherein the reference component is triphenyl phosphine oxide.