CLAIMS

1. A process for producing one or more fermentation products, the process comprising;

   a. providing a CO-rich C1-containing gaseous substrate to an inoculation reactor comprising a liquid nutrient medium containing a culture of one or more C1-fixing microorganism;

   b. fermenting the CO-rich C1-containing gaseous substrate to produce an inoculum;

   c. passing at least a portion of the inoculum to a bioreactor system, the bioreactor system comprising at least one bioreactor containing a culture of one or more C1-fixing microorganism in a liquid nutrient medium;

   d. passing an H_2 rich C1-containing gaseous substrate to the bioreactor system; and

   e. fermenting the H_2 rich C1-containing gaseous substrate to produce at least one fermentation product.

2. The process of claim 1, wherein the CO-rich C1-containing gaseous substrate comprises H_2 at an H_2:CO molar ratio of less than 1:1.

3. The process of claim 1, wherein the CO-rich C1-containing gaseous substrate comprises H_2 at an H_2:CO molar ratio of less than 0.5:1.

4. The process of claim 1, wherein the CO-rich C1-containing gaseous substrate comprises H_2 at an H_2:CO molar ratio between 0.02:1 to 1:1.

5. The process of claim 1, wherein the H_2 rich C1-containing gaseous substrate comprises H_2 at an H_2:CO molar ratio of at least 1.1:1.

6. The process of claim 1, wherein the H_2 rich C1-containing gaseous substrate comprises H_2 at an H_2:CO molar ratio between 1.1:1 to 6:1.

7. The process of claim 1, wherein the C1-fixing microorganism is a carboxydotrophic bacterium.

8. The process of claim 7, wherein the carboxydotrophic bacterium is selected from the group consisting of *Moorella, Clostridium, Ruminococcus, Acetobacterium, Eubacterium, Butyribacterium, Oxobacter, Methanosarcina*, and *Desulfotomaculum.*

9. The process of claim 7, wherein the carboxydotrophic bacterium is *Clostridium autoethanogenum.*

10. The process of claim 1 wherein the bioreactor system comprises one or more primary bioreactors linked to one or more secondary bioreactors.