

CLAIMS

1. A process for producing a fermentable gas stream from an input gas stream, the input gas stream comprising CO, CO₂, or H₂, or a combination thereof, the process comprising:
 - a. passing the input gas stream to a hydrolysis module, wherein at least one constituent of the gas stream is removed and/or converted to provide a post-hydrolysis gas stream;
 - b. passing the post-hydrolysis gas stream to an acid gas removal module, wherein at least one further constituent of the gas stream is removed and/or converted to produce an acid gas depleted stream; and
 - c. passing the acid gas depleted stream to a deoxygenation module, wherein at least one further constituent is removed and/or converted to produce a fermentable gas stream.
2. The process of claim 1, wherein at least one constituent removed and/or converted is a microbe inhibitor and/or a catalyst inhibitor.
3. The process of claim 1, wherein at least one or more of the constituents removed and/or converted by the hydrolysis module is carbonyl sulfide (COS) and/or hydrogen cyanide (HCN).
4. The process of claim 1, wherein at least one or more of the constituents removed and/or converted by the acid gas removal module is selected from the group consisting of carbon dioxide (CO₂), hydrogen sulfide (H₂S), and hydrogen cyanide (HCN).
5. The process of claim 1, wherein at least one or more of the constituents removed and/or converted by the deoxygenation module is oxygen (O₂) and/or acetylene (C₂H₂).
6. The process of claim 1, wherein the hydrolysis module is bypassed, in whole or in part, and the input gas stream is delivered to the acid gas removal module.
7. The process of claim 1, wherein the process includes passing the acid gas depleted stream to a catalytic hydrogenation module, prior to being passed to the deoxygenation module, wherein at least one constituent from the acid gas depleted stream is removed and/or converted prior to being passed to the deoxygenation module.
8. The process of claim 7, wherein at least one constituent removed and/or converted by the catalytic hydrogenation module is acetylene (C₂H₂).

9. The process of claim 1, wherein the process further comprises one or more monitoring devices, placed before and/or after each module, for measuring the level of constituents in the gas stream.
10. The process of claim 9, wherein the process is capable of bypassing one or more module as a function of the level of one or more constituent in the gas stream.
11. The process of claim 9, wherein the process includes passing the fermentable gas stream to a hydrogen cyanide removal module, prior to being passed to the bioreactor, for removing at least a portion of hydrogen cyanide from the fermentable gas stream.
12. The process of claim 1, wherein the fermentable gas stream comprises no more than one hundred parts per million (100 ppm) oxygen (O₂), one part per million (1 ppm) hydrogen cyanide (HCN), and one part per million (1 ppm) acetylene (C₂H₂).
13. The process of claim 1, further comprising passing at least a portion of the fermentable gas stream to a bioreactor, wherein the bioreactor contains a culture comprising a fermentation broth and one or more microorganisms.
14. The process of claim 1, wherein at least a portion of the input gas stream is a synthesis gas and/or a producer gas.
15. A process for removing oxygen, acetylene, and hydrogen cyanide from an input gas stream, comprising reducing the oxygen to less than 100 ppm, reducing the acetylene to less than 1 ppm, and reducing the hydrogen cyanide to less than 1 ppm, by contacting the input gas stream with a catalyst, wherein said catalyst comprises copper supported on alumina, silica, titania, ceria, lanthana, carbon, silica-alumina, or zeolites.
16. The process of claim 15, wherein the input gas stream comprises oxygen up to 7000 ppm, acetylene up to 700 ppm, and hydrogen cyanide up to 60 ppm.
17. The process of claim 15, wherein the input gas stream comprises oxygen up to 10000 ppm, acetylene up to 1500 ppm, and hydrogen cyanide up to 500 ppm.
18. The process of claim 15, wherein the process consumes less than 10 percent of the carbon monoxide in the input gas stream.
19. The process of claim 15, wherein the process is carried out at a pressure of at least 138 kPag.
20. The process of claim 15, wherein the catalyst is sulfided.