Applications describing the process with a specific description of a recycle gas describes the gas loop as comprising a means of purification, such as an amine scrubber for removal of hydrogen sulfide and carbon oxides.

It has now been identified that the negative impact of carbon oxides on the deoxygenation process is less than expected, especially if using a catalyst not comprising cobalt, and therefore the provision of a process in which CO and CO_2 are present during deoxygenation is related to a significant cost reduction both in terms of investment and in terms of operation.

Summary

In one aspect of the present disclosure, there is provided a method for production of a hydrocarbon mixture from a feedstock stream comprising oxygenates and a make-up hydrogen gas stream, comprising the steps of directing a feed stream, comprising the feedstock stream comprising oxygenates, the make-up hydrogen gas stream and a hydrogen rich gas stream, to contact a material catalytically active in deoxygenation under active deoxygenation conditions and withdrawing a deoxygenated product stream, characterized in the hydrogen rich gas stream comprising at least 70% hydrogen, at least 0.1% carbon oxides and at least 50 ppm H_2S.

In another aspect of the present disclosure, there is provided a process plant section for conversion of a feedstock stream comprising oxygenates to a hydrocarbon mixture, comprising a deoxygenation reactor having an inlet and an outlet, a separation section having an inlet and a gas outlet, an aqueous phase outlet and a hydrocarbon phase outlet, wherein said deoxygenation reactor inlet is configured for receiving said feedstock and a recycled hydrogen rich gas stream, said separator is configured for receiving a deoxygenated product stream from said deoxygenation reactor outlet, and the separation section gas outlet is configured for providing said recycled hydrogen rich gas stream, characterized in said process plant section not comprising an amine scrubber configured for treating the stream of the separation section gas outlet.

Description

In the following the term deoxygenation shall be used to signify removal of oxygen from oxygenates by formation of water in the presence of hydrogen (also known as hydrodeoxygenation), as well as removal of oxygen from oxygenates by formation of carbon oxides in the presence of hydrogen (also known as decarboxylation).

In the following the term active deoxygenation conditions shall be used to signify conditions under which at least 10% conversion by deoxygenation shall take place.

In the following where concentrations (typically in liquid or solid phase) are stated in wt% this shall be understood as weight/weight %.

In the following where concentrations in the gas phase are stated, they are, unless otherwise specified given as molar (volumetric) concentration, e.g. vol% or ppm_{vol}.

A broad aspect of the present disclosure relate to a method for production of a hydrocarbon mixture from a feedstock stream comprising oxygenates and a make-up hydrogen gas stream, comprising the steps of directing a feed stream, comprising the feedstock stream comprising oxygenates, the make-up hydrogen gas stream and a hydrogen rich gas stream, to contact a material catalytically active in deoxygenation under active deoxygenation conditions and withdrawing a deoxygenated product stream, characterized in the hydrogen rich gas stream comprising at least 70 vol% hydrogen, at least 0.1 vol% carbon oxides and at least 50 ppm_{vol} H_2S, with the associated benefit that such a method, where carbon oxides are allowed to be present may be realized without requiring a step of purifying said recycled hydrogen rich gas stream, e.g. by use of an amine wash.