Description

Title of Invention : A process for recovery of hydrogen during hydroprocessing of a feedstock comprising oxygenates

Technical Field

[0001] The present invention relates to the field of upgrading liquids originating from thermal decomposition of solid feedstocks.

Technical Problem

[0002] Oxygenates originating from biological materials or from thermal decomposition of solid feedstocks, such as mixed municipal waste, mixed or sorted plastic waste and forestry waste provides a liquid product (for simplicity pyrolysis oil or raw pyrolysis oil) which may be upgraded to quality hydrocarbons and be used as transportation fuels or petrochemical raw materials. The product may also be richer in oxygenates content than commonly required for hydrocarbon transportation fuels, either in the expectation of subsequent hydrotreatment at a different site or in the intention of using such an oxygenate rich product.

[0003] When the final product is rich in oxygenates, the processing conditions and intermediate products will differ from other hydrotreatment where intermediate and final products of quantitatively converted to hydrocarbons. This also means that intermediate processes for purifying intermediate products will differ, and specifically, the presence of oxygenates in the product will mean that a higher amount of product is soluble in wash water, which may result in a yield loss.

[0004] We have identified that this yield loss may be reduced by full or partial recycle of the wash water, such that washing is made with a stream with no capacity for withdrawal of oxygenates, as it is already saturated in oxygenates.

Summary

[0004a] In one aspect, the present disclosure refers to a process for partial hydroprocessing of a feedstock comprising oxygenates, comprising the steps of

a. directing said feedstock, an amount of make-up hydrogen and a recycle gas to a catalytic hydrotreatment process under conditions converting 30-95% of oxygenates to hydrocarbons, to provide a partially hydroprocessed product stream,

b. adding an amount of recycled wash water comprising at least 0.1 wt% oxygenates, to a stream comprising at least 50 wt% of said partially hydroprocessed product stream, optionally in combination with a further amount of wash water, to provide a combined hydroprocessed product stream,

c. cooling the combined hydroprocessed product stream and separating it in a vapor product fraction, a liquid aqueous fraction and a liquid product fraction,

d. withdrawing as a waste stream, a first amount of said liquid aqueous fraction,

e. directing as said amount of recycled wash water, a second amount of said liquid aqueous fraction.

[0004b] In another aspect, the present disclosure refers to a process plant configured for carrying out a process as described herein.

Definitions

[0005] It would be understood that the unit “MPag” denotes MPa gauge, i.e. pressure above surroundings.

[0006] It would be understood, that the unit Nm^3 means “normal” m^3, i.e. the amount of gas taken up this volume at 0°C and 1 atmosphere.