Title: Process for stabilization of reactive liquid feedstock

The present invention relates to a process for conversion of a reactive liquid feedstock.

Transportation fuels and petrochemical feedstock may be produced from renewable feedstocks, including waste products, side products and recycled products, to increase the environmental sustainability. Typically, such renewable fe
edstocks are rich in oxygenates, and commonly they are highly reactive, especially if originating from thermal decomposition processes such as pyrolysis, hydrothermal liquefaction and other processes where solids are converted to liquids.

Unfortunately, the reactive liquid feedstock originating from these processes may be difficult to process. The reactive liquid feedstock may comprise olefins and reactive oxygenates, which are prone to polymerization and solidification under the conditions of operation.

The conversion of the reactive liquid feedstock may be related to extensive heat release which for renewable feedstock based on e.g. triglycerides has been handled by recycle of product.

However, recycle increases the volume of all process equipment between the point where the recycle stream is let in to the point where it is withdrawn, as well as the energy required for pumping these increased process volumes.

It has now been realized that the benefits of recycle may be realized if a high recycle ratio is introduced for an initial reactor only, without causing a related increase of process equipment size for the remainder of the process.

Summary

In a first aspect of the present disclosure, there is provided a process for conversion of a reactive liquid feedstock stream containing at least 40 wt% carbon into a stabilized composition, comprising the steps of

a. directing a diluent stream and the reactive liquid feedstock stream as a combined stream having a first hydrogen consumption potential, to contact a material catalytically active in hydrotreatment which during operation has a lowest temperature of at least 80°C and a highest temperature of less than 250°C in the presence of dihydrogen,
b. withdrawing a stabilized composition stream having a second combined hydrogen consumption potential which is less than 80% and more than 10% of the first hydrogen consumption potential,
c. providing an amount of the liquid phase of said stabilized composition stream as said diluent stream

wherein the hydrogen consumption potential for a composition shall be understood as the amount of hydrogen required for conversion of the composition into a saturated hydrocarbon.

In another aspect of the present disclosure, there is provided a process plant configured for receiving a reactive liquid feedstock, configured for receiving an amount of dihydrogen and configured for providing a stabilized composition as disclosed herein.

Description

As used herein, the term hydrogen consumption potential for a composition shall be understood as the amount of hydrogen required for conversion of the composition into a saturated hydrocarbon. As an example, oleic acid, $CH_3(CH_2)_7CH=CH(CH_2)_7COOH$ (fw=282.5 g/mol) may react with 4 H_2 molecules according to the following:

$$CH_3(CH_2)_7CH=CH(CH_2)_7COOH + 3\ H_2 = CH_3(CH_2)_{16}CH_3 + 2\ H_2O$$