

Title: Hydroprocessing of waste tyre pyrolysis oil with vegetable and/or fatty material

5 The present invention relates to a process and plant for hydroprocessing of a bio-crude oil feed produced from the thermal decomposition of a solid feed stream, together with a vegetable and/or fatty material feed. The solid feed stream comprises waste tyres, the thermal decomposition is pyrolysis, and the bio-crude oil feed is waste tyre pyrolysis oil.

10 The co-processing hydrocarbon fuel feeds by combining a fossil fuel feed such as petroleum feed with a vegetable oil feed in hydroprocessing, is well-known. However, bio-crude oils produced by thermal decomposition such as by pyrolysis and hydrothermal liquefaction (HTL) of a solid renewable feed, e.g. lignocellulosic biomass, are generally not miscible with vegetable oils and/or fatty materials including fatty acids, thus co-processing of these feeds in a hydroprocessing step such as hydrodeoxygenation (HDO)
15 has so far been a significant challenge to overcome.

Stummann et al. "Hydrotreatment of Catalytic Fast Pyrolysis Oil to Renewable Fuels", NAM27, The 27th North American Catalysis Society Meeting, May 22-27, 2022 New
20 York, NY, discloses a study where a Catalytic Fast Pyrolysis (CFP) oil is combined with a vegetable oil, here soy oil, in a stirred batch reactor.

Still, Applicant finds that vegetable oil is not miscible with most untreated catalytic pyrolysis oils, hence it is highly difficult to make it work in an industrial hydrotreating reactor. The hydrotreating reactor processing the co-feed will plug after few days when running at industrially relevant conditions.
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It has now been found that despite that vegetable oil is not miscible in catalytic and non-catalytic pyrolysis and hydrothermal liquefaction (HTL) bio-crude oil, it is miscible in waste tyre pyrolysis oil. The latter has a low content of oxygen (O) and thus may be
30 regarded as being partly deoxygenated.

SUMMARY

In one aspect, the present disclosure provides a process for producing a hydrocarbon feed, comprising the steps of:

- 5 - providing a bio-crude oil feed comprising 0.1-5 wt% oxygen (O);
 - providing a vegetable oil and/or fatty material feed;
 - combining the bio-crude oil feed comprising 0.1-5 wt% O with the vegetable oil and/or fatty material feed, for producing said hydrocarbon feed;
 wherein said bio-crude oil feed comprising 0.1-5 wt% O is a waste tyre pyrolysis oil
10 feed.

In another aspect, the present disclosure provides a plant for conducting the process as described herein, comprising:

- 15 - a conduit providing a bio-crude oil feed comprising 0.1-5 wt% oxygen (O), in which said bio-crude oil feed is a waste tyre pyrolysis oil feed;
 - a conduit providing a vegetable oil and/or fatty material feed;
 - a mixing point for combining the bio-crude oil comprising 0.1-5 wt% O with the vegetable oil and/or fatty material feed, for producing a hydrocarbon feed;
 - optionally, upstream said mixing point, a stabilization reactor arranged to receive the
20 waste tyre pyrolysis oil feed and provide a stabilized waste tyre pyrolysis oil feed.

DETAILED DESCRIPTION

- 25 Accordingly, in a general embodiment according to a first aspect of the invention, there is provided a process for producing a hydrocarbon feed, comprising the steps of: