

METHOD FOR REVAMPING A CONVENTIONAL MINERAL OILS  
REFINERY TO A BIOREFINERY

SUMMARY

In one aspect, there is provided a method for revamping  
5 a refinery comprising a system containing two  
hydrodesulfurization units, U1 and U2, into a  
biorefinery comprising a production unit of hydrocarbon  
fractions from mixtures of a biological origin  
containing fatty acid esters by means of their  
10 hydrodeoxygenation and isomerization,  
wherein each of the hydrodesulfurization units U1 and  
U2 comprises:

- a hydrodesulfurization reactor, (A1) for the unit  
U1 and (A2) for the unit U2, wherein said reactor  
15 contains a hydrodesulfurization catalyst;
- one or more heat exchangers between the feedstock  
and effluent of the reactor;
- a heating system of the feedstock upstream of the  
reactor;
- 20 - an acid gas treatment unit downstream of the  
reactor, containing an absorbent (B) for H<sub>2</sub>S, T1 in  
the unit U1 and T2 in the unit U2,  
and wherein said method comprises:
- installing a line L between the units U1 and U2  
25 which connects them in series;
- installing a recycling line of the product for the  
unit U1 and possibly for the unit U2,
- substituting the hydrodesulfurization catalyst in  
the reactor A1 with a hydrodeoxygenation catalyst;

- substituting the hydrodesulfurization catalyst in the reactor A2 with an isomerization catalyst;
- installing a by-pass line X of the acid gas treatment unit T2 of the unit U2;
- 5     - substituting the absorbent (B) in the acid gas treatment unit T1 with a specific absorbent for CO<sub>2</sub> and H<sub>2</sub>S.

10     In one aspect, there is provided a process for the production of hydrocarbon fractions starting from mixtures of a biological origin containing fatty acid esters which comprises the following steps:

- (1) hydrodeoxygenation of the mixture of a biological origin;
- (2) hydroisomerization of the mixture resulting from step (1), after a possible purification process,
- 15     wherein said process is effected using the biorefinery as disclosed herein.

20     In one aspect, there is provided a HDO/ISO process for the production of hydrocarbon fractions starting from mixtures of a biological origin containing fatty acid esters, and possibly containing free fatty acids, which comprises the following steps:

- (1) hydrodeoxygenation of the mixture of a biological origin;
- 25     (2) separation of the mixture resulting from step (1) into a hydrocarbon fraction and a gaseous mixture G comprising H<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub>S ,
- (3) hydroisomerization of the hydrocarbon fraction obtained in step (2),

(4) separation of the gaseous mixture G into a stream of hydrogen and a gaseous mixture of CO<sub>2</sub> and H<sub>2</sub>S,

(5) separation of the gaseous mixture of CO<sub>2</sub> and H<sub>2</sub>S obtained in step (4) into a stream of H<sub>2</sub>S and a stream of CO<sub>2</sub>,

(6) feeding the stream of H<sub>2</sub>S obtained in step (5) to the hydrodeoxygenation step (1).

#### DETAILED DESCRIPTION

10       A method is described for revamping a conventional refinery of mineral oils into a biorefinery, characterized by a production scheme which allows the treatment of raw materials of a biological origin (vegetable oils, animal fats, exhausted cooking oils)  
15 for the production of biofuels, prevalently high-quality biodiesel.

      This method allows the re-use of existing plants, allowing, in particular, the revamping of hydrodesulfurization plants into production plants of  
20 hydrocarbon fractions which can be used as diesel fuel, or as diesel fuel components, starting from a mixture of a biological origin containing triglycerides possibly with aliquots of free fatty acids. Together with diesel fuel, the plants deriving from the  
25 reconversion of desulfurization plants also produce aliquots of naphtha and LPG, which are consequently also products deriving from mixtures of a biological origin.

      Through this method, it is possible to re-use

existing equipment of hydrodesulfurization units by means of a rearrangement which allows to obtain a new configuration, suitable for carrying out processes for the production of fuel bases from biological mixtures, 5 in particular diesel: said rearrangement is capable of providing the same efficiency as a plant specifically constructed for this process, with reduced costs.