catalyst may be replaced by fresh catalyst material. However, this is not preferred due to operational costs. The static catalyst bed(s) of the catalyst reactor of prior art cannot be used while regenerating or replacing the catalyst. This implies interruption to the process. An interruption to a process implies decreased efficiency.

Summary

According to a first aspect, the present disclosure refers to a system for producing catalytically treated pyrolytic vapor, the system comprising

- a pyrolysis reactor (100) configured to produce pyrolytic vapor,
- a catalytic reactor (200) limiting a bed area (B) into which a fluidized catalyst bed is configured to form in use, the catalytic reactor (200) comprising
    - a first inlet (212) for letting in at least a clean part of the pyrolytic vapor,
    - a second inlet (214) for letting in particulate catalyst,
    - a first outlet (222) for letting out catalytically treated pyrolytic vapor,
    - a second outlet (224) for letting out particulate catalyst, and
    - a static mixer (300) configured to spread the particulate catalyst within the bed area (B), wherein
- the catalytic reactor (200) is configured to produce a mixture of the particulate catalyst and the catalytically treated pyrolytic vapor from the pyrolytic vapor.

According to another aspect, the present disclosure refers to a method for producing catalytically treated pyrolytic vapor, the method comprising

- producing pyrolytic vapor,
- feeding at least a clean part of the pyrolytic vapor and particulate catalyst into a catalytic reactor,
- fluidizing the pyrolytic vapor and the particulate catalyst in a bed area of the catalytic reactor,
- allowing the pyrolytic vapor to chemically react in the presence of the particulate catalyst to produce a mixture of the particulate catalyst and catalytically treated pyrolytic vapor, and
- in the bed area, mixing the pyrolytic vapor and the particulate catalyst with a static mixer.

It has been found that the catalyst can be replaced or regenerated without interrupting the process, if a fluidized catalyst bed is used to catalytically treat the pyrolytic vapors. In a fluidized bed catalytic reactor, new catalyst or regenerated catalyst is fed to the reactor, and used catalyst is simultaneously withdrawn therefrom. However, while studying the operation of a fluidized bed catalytic reactor, the inventors observed a tendency of the catalyst material to accumulate on walls of the catalytic reactor. This phenomenon reduces the effective area between the catalyst and the pyrolytic vapor thereby imposing longer reaction times or poorer quality of the catalytically treated pyrolytic vapor. In addition, this phenomenon causes the flow profile to be uneven thereby reducing the reaction time available. The inventors have further found that better mixing of the particulate catalyst material and the pyrolytic vapor can be achieved by using a static mixer. This improves the quality of the catalytically treated pyrolytic vapor without the need of longer reaction times. Or conversely, this provides the same quality with a shorter reaction time, i.e. smaller equipment. Since the materials flow in the catalytic reactor, a long reaction time indicates a long low path.

The system according to the present disclosure is disclosed in more specific terms in claim 1. The method according to the present disclosure is disclosed in more specific terms in claim 13.

Brief description of the drawings

Figs. 1a to 1d show systems for producing catalytically treated pyrolytic vapor,
Figs. 2a to 2d show systems for producing catalytically treated pyrolytic vapor and crude condensate therefrom,
Fig. 3a shows, in a side view, an embodiment of a static mixer,