

In a first aspect, there is provided a system for producing oxidized olefins, comprising:

two or more reactors, each of the two or more reactors including a number of reaction tubes each including a first surface defining a first side and a second surface opposite the first surface that defines a second side of each the number of reaction tubes;

a catalyst for catalytic oxidation of olefins on the first side of the number of reaction tubes;

an inlet to each of the two or more reactors that supplies a mixture comprising olefins and oxygen to the catalyst, where a common supply line supplies the mixture to each inlet of the two or more reactors;

a product outlet from each of the two or more reactors that receives a product stream comprising the oxidized olefins, where each product outlet joins to a single common product stream comprising the oxidized olefins; and

only one coolant drum connected to the two or more reactors, where coolant fluid passing through the two or more reactors removes heat from the number of reaction tubes and flows into the only one coolant drum from a number of coolant fluid outlet streams of each of the two or more reactors and the only one coolant drum supplies the coolant fluid at a common temperature to a number of coolant fluid inlet streams of each of the two or more reactors.

Embodiments of the present disclosure also provide for the catalyst on the first side of the number of reaction tubes of each of the two or more reactors to deactivate at a substantially equivalent rate.

Embodiments of the present disclosure also include a method for producing oxidized olefins. For the various embodiments, the method includes supplying a mixture comprising olefins and oxygen to two or more reactors from a common supply line. The mixture is reacted in each of the two or more reactors to produce a product stream of the oxidized olefins for each reactor. The product stream from each of the two or more reactors is joined into a single common product stream comprising the oxidized olefins. Coolant fluid is supplied from each reactor to a single coolant drum by a number of coolant fluid outlet streams of each reactor. The single coolant drum supplies the coolant fluid at a common temperature to each of the two or more reactors to remove heat produced in the two or more reactors during the reaction of the mixture.

In a second aspect, there is provided a method for producing oxidized olefins, comprising:

supplying a mixture comprising olefins and oxygen to two or more reactors from a common supply line;

reacting the mixture in each of the two or more reactors to produce a product stream comprising the oxidized olefins;

joining the product stream from each of the two or more reactors into a single common product stream comprising the oxidized olefins;

supplying a coolant fluid from each of the two or more reactors to only one coolant drum by a number of coolant fluid outlet streams of each of the two or more reactors; and

supplying the coolant fluid at a common temperature from the only one coolant drum to each of the two or more reactors to remove heat produced in the two or more reactors during the reaction of the mixture.

Embodiments of the present disclosure also provide maintaining a promoter concentration feed of each of the two or more reactors within a tolerance level. In various embodiments, coolant fluid outlet and inlet piping is designed for providing substantially equivalent cooling of each of the two or more reactors.

Definitions

As used herein, “olefin” (e.g., alkene) is a hydrocarbon with a carbon-carbon double bond. More than one molecule of the olefin is referred to herein as “olefins.” Olefins can include more than one molecule of each olefin in a mixture of olefins.

5 As used herein, “ethylene oxide” (e.g., oxirane) has the chemical formula C_2H_4O at standard temperature and pressure of 0 °C and absolute pressure of 100 kPa (IUPAC).

As used herein, an “indirect heat exchanger” is defined as a device in which heat is transferred between one medium and another, where the media are separated
10 by a solid wall so that they do not mix. Such indirect heat exchangers can include, but are not limited to, shell and tube heat exchangers, plate heat exchangers (e.g., plate and frame), cross heat exchangers, among others.

As used herein, “group” is defined as is known in the art according to the standard periodic table, version dated February 19, 2010, by International Union of
15 Pure and Applied Chemistry (IUPAC).