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(54) Title: METHODS AND DEVICES FOR OXIDIZING A HYDROCARBON TO FORM AN ACID

(57) Abstract

Methods and devices for controlling the reaction of a hydrocarbon to an acid by making phase-related adjustments are disclosed. In order to improve reaction rate and reactivity of the oxidation, a single phase at the operating temperature is attained and maintained by adjusting one or more of gaseous oxidant flow rate, pressure in the reaction zone, temperature in the reaction zone, feed rate of hydrocarbon, feed rate of solvent, feed rate of water if water is being fed, feed rate of the catalyst and other parameters. Methods and devices are also disclosed, wherein a hydrocarbon is reacted at a steady state with a gaseous oxidant to form an acid in a liquid mixture. The amount of water is maintained between a maximum level of water, over which maximum level the substantially single liquid phase is transformed to two liquid phases, and a minimum level under which catalyst precipitates. Further, methods are disclosed, wherein the temperature of the mixture is lowered to a point at which solid dibasic acid is precipitated, while maintaining a single liquid phase, and optionally all the catalyst in solution. At least part of the formed acid is then removed. The preferred hydrocarbon is cyclohexane, the preferred acid is adipic acid, the preferred solvent is acetic acid, and the preferred catalyst is cobalt (II) acetate tetrahydrate.

