It would be desirable to have a modified conventional propylene process for producing carboxylic acids that could operate using low-purity propylene feedstocks. Furthermore, it would advantageous if the modified conventional process could be capable of converting unreacted propane in the AOG to acrylic acid product to reduce the negative impact of the capacity loss.

SUMMARY ~~OF THE INVENTION~~

~~The invention is such~~In an aspect, there is provided a process comprising:

(A) contacting a gas comprising oxygen, propane and propylene with at least one catalyst under reaction conditions sufficient to at least partially convert the propylene into a final product comprising acrylic acid;

(B) feeding said final product to a separation column, in which the final product is split into a liquid stream, which is rich in acrylic acid, and a gaseous by-product stream comprising propane and propylene in a volume ratio of from 99.9:0.1 to 95:5;

(C) contacting the gaseous by-product stream with oxygen in the presence of a catalyst under reaction conditions sufficient to at least partially convert propane to acrylic acid.

It has surprisingly been found that a good yield of acrylic acid can be obtained by processing an AOG feed containing a low concentration of propane.

DETAILED DESCRIPTION OF THE INVENTION

The process involves oxidizing propylene to acrylic acid, and further involves oxidizing propane in the AOG to acrylic acid. The process can accomplish the propylene oxidation in one or two steps. The two-step process involves oxidizing propylene to acrolein, and oxidizing acrolein to acrylic acid. The one-step process comprises oxidizing propylene directly to acrylic acid. As mentioned hereinabove, chemical or polymer grade propylene commonly is used in the preparation of acrylic acid. The process of the present invention advantageously is able to use lower purity propylene-containing gases as a feed to the process. The process includes a finishing reactor to convert unreacted propane in the AOG to acrylic acid.

As used herein, "a," "an," "the," "at least one," and "one or more" are used interchangeably. The terms "comprises," "includes," and variations thereof do not have a