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(21) Application No. 2415/77 (22) Filed 20 Jan. 1977 (19)

(31) Convention Application No. 19439 (32) Filed 21 Jan. 1976 in

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(72) Inventors LUIGI GAZZI and ORONZO SGUERA

(54) SEPARATION OF ETHYLENE FROM ETHANE

(71) We, SNAMPROGETTI S.p.A., an Italian company, of Corso Venezia 16, Milan, Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of separating ethylene from ethane, starting from a C_2 cut.

It is known that ethylene can be separated from ethane by distillation of a C_2 fraction which contains, in addition to ethylene and ethane, other components such as methane, acetylene and propylene in amounts which are not above the maximum allowable quantity in the desired end product. The C_2 cut is fed to a distillation column and is separated therein into its components. Inasmuch as the volatility of ethylene is very similar to that of ethane, fractionation is extremely burdensome both from the point of view of investment and from that of the running costs on account of the great number of plates required for carrying out the separation and the considerable height of the distillation column.

It has been found and this is the basis of the present invention, that it is possible to reduce the defects of the conventional art by splitting the C_2 cut, prior to feeding the same to the distillation column, into two fractions, one of which contains, in terms of percentage by weight, a greater proportion of ethylene to ethane than in the initial C_2 cut, and the other of which contains, still in terms of percentage by weight, a greater proportion of ethane to ethylene, than in the initial C_2 cut.

Thus, the present invention provides a process for separating by distillation ethylene from ethane, starting from a C_2 cut, which process comprises subjecting to the distillation first and second discrete fractions obtained from the C_2 cut by means of at least one fractionation of the C_2 cut, the first discrete fraction having a weight ratio of ethylene to ethane greater than that in the initial C_2 cut, and the second discrete fraction having weight ratio of ethane to ethylene greater than that in the initial C_2 cut.

The splitting of the starting batch into the two fractions can be effected through one or more consecutive fractionations, which are carried out with a view to separating also any undesirable compounds. The initial C_2 cut, after having been split into a first fraction in which the weight ratio of ethylene to ethane is greater than that in the initial cut, and into a second fraction in which the weight ratio of ethane to ethylene is greater than that of the initial cut, is fed to a distillation column, preferably in a manner such that the first fraction is fed at a point of the distillation column which is above the point at which the second fraction is fed.

The Complete Specification of our copending British Patent Application No. 2413/77 (Serial No. 1,539,291) describes, inter alia, a process for separating ethylene from ethane which includes feeding to a rectification column a first mixture in which the weight ratio of ethylene to ethane is greater than that in the initial batch and a second mixture in which the weight ratio of ethane to ethylene is greater than that in the initial batch. That process is illustrated by various Examples in Specification No. 2413/77 (Serial No. 1,539,291) and for full operating details of the process of the present specification, reference is made to Specification No. 2413/77 (Serial No. 1,539,291).

WHAT WE CLAIM IS:—

1. A process for separating by distillation ethylene from ethane, starting from a C_2 cut, which process comprises subjecting to the distillation first and second discrete fractions obtained from the C_2 cut by means of at least one fractionation of the C_2 cut, the first discrete fraction having a weight ratio of ethylene to ethane greater than that in the inital C_2 cut, and the second discrete fraction having weight ratio of ethane to ethylene greater than that in the initial C_2 cut.

2. A process according to claim 1, wherein the first discrete fraction is fed to a dis-

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This invention relates to a method of separating ethylene from ethane, starting from a C_2 cut.

It is known that ethylene can be separated from ethane by distillation of a C_2 fraction which contains, in addition to ethylene and ethane, other components such as methane, acetylene and propylene in amounts which are not above the maximum allowable quantity in the desired end product. The C_2 cut is fed to a distillation column and is separated therein into its components. Inasmuch as the volatility of ethylene is very similar to that of ethane, fractionation is extremely burdensome both from the point of view of investment and from that of the running costs on account of the great number of plates required for carrying out the separation and the considerable height of the distillation column.

It has been found and this is the basis of the present invention, that it is possible to reduce the defects of the conventional art by splitting the C_2 cut, prior to feeding the same to the distillation column, into two fractions, one of which contains, in terms of percentage by weight, a greater proportion of ethylene to ethane than in the initial C_2 cut, and the other of which contains, still in terms of percentage by weight, a greater proportion of ethane to ethylene, than in the initial C_2 cut.

Thus, the present invention provides a process for separating by distillation ethylene from ethane, starting from a C_2 cut, which process comprises subjecting to the distillation first and second discrete fractions obtained from the C_2 cut by means of at least one fractionation of the C_2 cut, the first discrete fraction having a weight ratio of ethylene to ethane greater than that in the initial C_2 cut, and the second discrete fraction having weight ratio of ethane to ethylene greater than that in the initial C_2 cut.

The splitting of the starting batch into the two fractions can be effected through one or more consecutive fractionations, which are carried out with a view to separating also any undesirable compounds. The initial C_2 cut, after having been split into a first fraction in which the weight ratio of ethylene to ethane is greater than that in the initial cut, and into a second fraction in which the weight ratio of ethane to ethylene is greater than that of the initial cut, is fed to a distillation column, preferably in a manner such that the first fraction is fed at a point of the distillation column which is above the point at which the second fraction is fed.

The Complete Specification of our copending British Patent Application No. 2413/77 (Serial No. 1,539,291) describes, inter alia, a process for separating ethylene from ethane which includes feeding to a rectification column a first mixture in which the weight ratio of ethylene to ethane is greater than that in the initial batch and a second mixture in which the weight ratio of ethane to ethylene is greater than that in the initial batch. That process is illustrated by various Examples in Specification No. 2413/77 (Serial No. 1,539,291) and for full operating details of the process of the present specification, reference is made to Specification No. 2413/77 (Serial No. 1,539,291).

WHAT WE CLAIM IS:—

1. A process for separating by distillation ethylene from ethane, starting from a C_2 cut, which process comprises subjecting to the distillation first and second discrete fractions obtained from the C_2 cut by means of at least one fractionation of the C_2 cut, the first discrete fraction having a weight ratio of ethylene to ethane greater than that in the inital C_2 cut, and the second discrete fraction having weight ratio of ethane to ethylene greater than that in the initial C_2 cut.

2. A process according to claim 1, wherein the first discrete fraction is fed to a dis-

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tillation column at a point above the point at which the second discrete fraction is fed to that column.

3. A process according to claim 1, substantially as hereinbefore described.

4. Ethane whenever separated by a process according to claim 1, 2 or 3.

5. Ethylene whenever separated by a process according to claim 1, 2 or 3.

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