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Description

This invention relates generally to method and apparatus for handling fluids. In one aspect it relates to apparatus for fluid handling in an alkylation process. In another aspect it relates to a method for reducing loss of acidic material during transfer of acid catalyst from a transport vehicle to a process vessel in an alkylation process.

Background of the Invention

It is common practice in the petroleum industry to produce high octane motor fuel by alkylating an isoparaffin with an olefin in the presence of a catalyst which preferably is liquid hydrofluoric acid or hydrogen fluoride (HF). Such a process is commonly known as an HF alkylation process or merely an alkylation process. The effluent from the alkylation reactor containing hydrocarbons and acid, is usually passed to a generally vertically arranged settler vessel at an intermediate point along the length of the settler vessel. A hydrocarbon phase is separated from an acid phase in the settler vessel, with the hydrocarbon phase contained in the upper part of the settler vessel and the acid phase contained in the lower part of the settler vessel. Accordingly a liquid-liquid interface between the acid phase and the hydrocarbon phase is formed within the settler vessel.

US-A-3,696,168 discloses a nozzle arrangement comprising variously disposed orifices, so that in an alkylation of isoparaffin with an olefin, the recycled isoparaffin containing a catalyst, usually hydrogen fluoride, can be brought into contact with the olefin feed, which is free of hydrogen fluoride, at the moment when this feed encounters the main body of the catalyst.

In a normal operation a portion of the liquid hydrofluoric acid phase is withdrawn from the lower part of the settler vessel, cooled and then recycled to the alkylation reactor for reuse in the alkylation process. It is known in an alkylation process that there is a tendency for water to accumulate in the acid catalyst as the acid catalyst is repeatedly recycled through the system. It is also known that a material known as acid soluble oil is produced in the alkylation reaction and that this material acts as diluent for the catalyst phase. In general the production of acid soluble oil is substantially in excess of that necessary or desirable for dilution of the catalyst.

It is common practice for alkylation systems employing acid type catalyst to include a so called "rerun" system through which at least a portion of the acid catalyst is continuously passed in normal operation to remove the wflter and the acid soluble oil. This purification of the acid catalyst results in anhydrous acid as a product and a small quantity of an azeotrope mixture of hydrogen fluoride and water as a by-product. The by-product mixture of hydrogen fluoride and water is generally discarded because of the relative difficulty accompanying its separation.

Because of the loss of HF acid from the rerun systems as organically combined fluoride in the azeotrope mixture of water and hydrogen fluoride, make-up acid must be added to the alkylation catalyst system either continuously or at periodic intervals. In order to have available make-up hydrofltoric acid at all times, fresh anhydrous acid is stored in an HF acid storage vessel from which fresh acid is conveyed to the alkylation process when needed. The acid may be conveyed from the HF acid storage vessel directly to the reaction zone itself or to the settler vessel.

Even in HF acid alkylation systems where make-up acid is added occasionally, for example once a month, only about ten percent of the total volume of HT acid inventory used in the alkylation process is added for make-up at any one time. Thus the volume of the HF acid storage vessel required to handle the HF acid make-up would be approximately equal to the volume of ten percent of the total KF acid inventory required for the alkylation process.

In order to safely operate the HF alkylation process, however, an acid storage vessel of sufficient volume to contain the total inventory of HF acid nsed in the alkylation process must be provided. This storage space is necessary to provide a safe storage vessel where the total inventory of HF acid used throughout the process could be safely stored in the event of an emergency such as a leak somewhere in the process. The total acid inventory includes acid required in the reactor, the cooler, and the settler, plus approximately 10% excess for make-up storage. Since this storage vessel is sized so as to hold the entire HF acid inventory but, under normal operation, only contains the quantity of acid required for make-up storage, there exists a relatively large vapor space in the acid storage vessel. Transfer of make-up acid from the storage vessel to the alkylation process is usually accomplished by compressed gas. This transfer generally involves pressuring the relatively large vapor space in the storage vessel with a gas such as nitrogen so that liquid HF acid is transferred from the storage vessel to the alkylation process which is at about 690 to 1030 kPa gauge (100 to 150 psig) pressure.

The fresh anhydrous liquid HF acid required to replenish the make-up acid is usually transported in steel railroad tank cars or truck trailers to the plant where it is being used and stored, and the acid must be transferred from the tank cars or truck trailers where the liquid HF acid is under a vapor pressure of about 240 to 410 kPa gauge (35-60 psig), to the HF acid alkylation storage vessel where the liquid HF acid catalyst is at a pressure of about 1030 to 1200 kPa gauge (150-157 psig) required for transfer to the process.

Transfer of HF acid from the transport vehicle to

the storage vessel is usually accomplished by venting the pressure in the storage vessel while pressuring the transport vehicle with nitrogen gas in such a manner that the liquid acid is forced through a transfer line from the transport vehicle to the acid storage vessel at a relative low pressure level compatible with the transport vehicle.

In normal operation, the relatively large gas or vapor space above the liquid HF acid level in the HF acid storage vessel is therefore filled with the pressuring gas required for transferring the acid catalyst to the process, and with whatever hydrogen fluoride that may have vaporized under the conditions of temperature and pressure existing in the HF acid storage vessel. Upon venting the storage vessel, such as at the time of replenishing the make-up acid, the vent gas carries with it a considerable amount of hydrogen fluoride which is then lost from the alkylation system. This loss of hydrogen fluoride in replenishing the make-up acid constitutes not only an economic loss of valuable material but also introduces a potential environmental health hazard since neutralizing of such HF containing vapors may not always be 100 percent effective. It is desired, therefore, to eliminate or at least minimize the loss of hydrogen fluoride vapor with the gases vented from a storage vessel containing liquid hydrofluoric acid.

Accordingly it is an object of this invention to improve environmental safety in operating an HF alkylation process.

A further object of this invention is to increase the safety of a petroleum refining process and the apparatus employed therein.

Yet another object of this invention is to provide apparatus and method for reducing the loss of hydrofluoric acid vapors from a vessel in which make-up HF acid is stored and must be occasionally recharged.

Summary of the Invention

In accordance with this invention, a fluid handling apparatus and a method for transferring a quantity of liquid acid catalyst for an alkylation process are provided as defined in the claims. As applied to an alkylation process having an acid storage vessel with capacity to contain the entire acid inventory, a relatively small volume make-up acid catalyst storage vessel is provided for storing only the required quantity of make-up acid catalyst. Further in accordance with this invention the make-up acid catalyst storage vessel is utilized as a pressure lock chamber in transferring liquid HF acid catalyst from a transport vehicle to a process vessel such as the settler or the acid inventory storage vessel. As used herein a pressure lock chamber is an enclosure with gates at each end and which is useful in transferring material between a vessel at one pressure level to another vessel at another pressure level.

According to the present method, an acid transfer from a transport vehicle to a process vessel involves unloading the liquid acid catalyst from the transport vehicle at one pressure level and passing the acid catalyst to the make-up acid storage vessel while venting only the small volume of the make-up acid storage vessel, and then pressure transferring the liquid acid catalyst from the make-up acid storage vessel to a process vessel which is at a higher pressure level than the transport vehicle.

With this arrangement, an inventory acid storage vessel is connected in parallel with a relatively small volume make-up acid storage vessel. The initial charge of acid required for the alkylation proress may be supplied directly to the big inventory acid storage vessel, and then pressure transferred to the settler vessel. Make-up acid can then be stored in the relatively small volume make-up acid storage vessel, and replacement make-up acid can be added to the make-up acid storage vessel directly from the transport vehicle, as required, without affecting the big inventory acid storage vessel. In this manner there is no need to pressurize the large vapor space in the inventory acid storage vessel to transfer make-up acid to a process vessel. More importantly, there is no need to vent the large vapor space in the inventory acid storage vessel when transferring acid from a transport vehicle to replenish the make-up acid storage thereby concerning the HF that may have vaporized in the inventory acid storage vessel.

Additional objects and advantages of the invention will be apparent from the following detailed description of the preferred embodiment of the invention as illustrated by the drawings in which:

Brief Description of the Drawings

FIG. 1 is a schematic representation illustrating process flow of a simplified HF alkylation process.

FIG. 2 is a schematic representation illustrating process flow of a compressed gas unloading system for a transport vehicle in accordance with the present invention.

FIG. 3 is an elevation view, partly in section, of a riser reactor, a settler vessel, a make-up acid storage vessel, an inventory acid storage vessel and an acid cooler illustrated in an arrangement suitable for carrying out this invention.

Detailed Description of the Preferred Embodiment

The present invention can be employed in any of the catalytic refining processes in which make-up acid catalyst is required to replace the loss of acid catalyst, such as from an acid purification step which is typically employed for the removal of water and acid soluble oils present in the acid catalyst.

This invention is described in terms of an HF acid

catalyst, however, a variety of alkylation catalysts can be employed in the alkylation process, including well known acid catalysts such as sulfuric acid, hydrofluoric acid, phosphoric acid, and other alkylation catalysts.

In the following discussion, parts which appear in more than one of the drawing figures shall be referred to by the same reference numeral in each of the drawing figures in which the part appears.

Referring now to the drawings, and in particular to FIG. 1, there is illustrated an alkylation reactor 10 which has inlet conduit 12 communicating therewith to supply liquid hydrofluoric acid. A cooler 14 is provided to cool the acid flowing in conduit 12. The feed stream of isoparaffins, such as isobutane, is supplied to the reactor 10 through conduit 16. An olefin feed stream, which can be a mixture of propylene and butylenes, for example, is supplied to the reactor 10 through conduit 17. The alkylation reaction is completed in reactor 10 by intimately contacting the hydrocarbons with the HF acid catalyst. The HF acid/hydrocarbon reaction mixture is removed from reactor 10 through a conduit 20 which communicates with a catalyst settler vessel 18.

In the catalyst settler vessel 18 the reaction effluent is separated into a hydrocarbon phase contained in the upper part of the catalyst settler vessel 18 and a catalyst phase contained in the lower part of the catalyst settler vessel 18. The combination of vessels including the reactor 10, cooler 14, and settler 18 contain an inventory of acid catalyst such that the level of acid catalyst 22 extends into the catalyst settler vessel 18.

The hydrocarbon phase contained in the upper part of the settler 18 is removed through a conduit 24 which communicates with a suitable separation means such as a fractionator, not illustrated. The acid phase in settler 18 is withdrawn through a conduit 26 which communicates with an acid purification unit 28. A portion of the acid withdrawn from the lower part of settler vessel 18 is heated in heater 27 and purified in acid purification unit 28 by distilling the acid from water and acid soluble oils. The purified acid is returned to the settler 18 through conduit 30 and the water and acid soluble oil is discharged through conduit 29. The remaining portion of the acid withdrawn from the lower part of settler vessel 18 is passed through conduit 12 to the cooler 14 and is recycled to the reactor 10. Make-up acid catalyst is supplied from a storage tank, as needed, through conduit 32 under compressed gas pressure.

Referring now to FIG. 2 there is illustrated a transport vehicle unloading facility 40 which can comprise a railroad tank car, or truck trailer having a valve arrangement including a safety valve, vapor valves, and eduction valves. Compressed gas, usually nitrogen, at a pressure which does not exceed the relief valve setting of the transport vehicle is supplied to the transport vehicle via conduits 42, 44, and pressure regulator valve 46. A pressure relief valve 48, which communicates with the source of compressed gas supply via conduit 42, is also provided to insure that a safe pressure for the compressed gas will not be exceeded. Compressed gas is utilized to unload liquid HF acid catalyst contained in the transport vehicle through the unloading facilities 40 via conduit 49 and valve 50 into a make-up acid storage vessel 52. The vessel 52 provides a relatively small volume for make-up acid storage compared to the inventory acid storage vessel 60. Using the make-up acid storage vessel 52, acid may be added to the alkylation process from a transport vehicle without venting the large vapor space of the inventory acid storage vessel 60 and thus avoiding the loss of HF acid vapor contained in the inventory vessel 60.

The compressed gas unloading procedure for the transport vehicle requires establishing a flow path from the transport vehicle and associated unloadng facility 40 to the make-up acid storage vessel 52, and equalizing the pressure in the transport vehicle and the vessel 52. Equalizing the pressure may be accomplished by isolating vessel 52 from the alkylation process by closing valves 68, 69, 74, and 75 and then venting the vessel 52 through an HF absorption system via conduit 54 and valve 56. After transfer of the liquid acid catalyst from the transport vehicle to the make-up acid storage vessel 52, the vessel 52 is then isolated from the transport vehicle before being pressurized to transfer the liquid HF acid to the alkylation process. Compressed gas supplied via conduit 62 and valve 64 is utilized to transfer the liquid HF acid contained in the vessel 52 into the alkylation process through valve 69 or to the acid inventory storage vessel 60 through valve 68 wherein the vessel 52 is pressurized to a pressure level which does not exceed the setting of pressure relief valve 57, 58, or 59. Transfer of the HF acid from the make-up acid storage vessel 52 to the inventory acid storage vessel 60 is accomplished by establishing a flow of HF acid via conduit 66 and valve 68, and transfer of HF acid from vessel 52 directly to the alkylation process is accomplished by establishing a flow of HF acid via conduits 66 and 70 and valve 69. Further compressed gas supplied to the inventory acid storage vessel 60 via conduits 62 and 63, and valve 65 can be utilized to provide an initial catalyst charge to the process or to add HF acid catalyst to the alkylation process via conduit 70 and valves 68 and 69. Also illustrated in FIG. 2 is valve 74 and conduit 76 which may be utilized for supplying an initial charge of HF acid catalyst to the inventory storage vessel 60 from the transport vehicle, as well as conduit 71 and valve 73 which may be utilized to vent the inventory acid storage vessel 60 while supplying acid catalyst to vessel 60 via conduit 76.

Referring now to FIG. 3 there is illustrated an arrangement of process vessels which is suitable for

use in the present invention. The illustrated reaction system maintains high circulation of HF acid through the acid cooler 14 by means of differential gravity between liquids in the two legs 10 and 12 associated with cooler 14. Further illustrated in FIG. 3 is the HF absorption system generally indicated at 80 in which hydrogen fluoride is absorbed from waste gas prior to flaring the waste gas.

This invention is applicable to various transport vehicles such as railroad tank cars, truck trailers, etc. which transport HF acid to user facilities. In accordance with the invention, the process apparatus includes a large acid inventory storage vessel and a relatively small make-up acid storage vessel. Loss of acid vapor is minimized in the alkylation process by storing the make-up acid in the relatively small acid storage vessel 52, and further minimized by using the make-up acid storage vessel 52 as a pressure lock chamber in transferring acid catalyst to the alkylation process from a transport vehicle.

Claims

1. Fluid handling apparatus comprising:
   a) process vessel means (18) associated with an alkylation process for containing liquid acid catalyst at a first pressure level;
   b) transport vehicle unloading means (40) comprising pressure supply, conduit and valve means (42, 44, 46) for unloading at a second pressure level a transport vehicle containing liquid acid catalyst under vapor pressure and
   c) transfer means for transferring the acid catalyst from said transport vehicle to said process vessel means (18),
   characterized in that
   d) a make-up acid catalyst storage vessel (52) associated with said alkylation process is provided having an inlet and an outlet and having a volume substantially less than the volume of said process vessel means;
   e) the transfer means include conduit means (49, 66, 70) and valve means (50, 69) connected to said make-up catalyst storage vessel for unloading liquid acid catalyst from said transport vehicle at said second pressure level and for passing liquid acid catalyst via said make-up catalyst storage vessel (52) used as a pressure lock chamber to said process vessel means (18) at said first pressure level.

2. The fluid handling apparatus in accordance with claim 1 wherein said transfer means comprise:
   a first conduit (49) for establishing a first flow path from said transport vehicle unloading means (40) to said inlet of said make-up acid catalyst storage vessel means (52);
   means (42, 46) for flowing liquid acid catalyst from said transport vehicle to said make-up acid catalyst storage vessel (52) through said first flow path;
   means (54, 56) for venting said make-up acid catalyst storage vessel (52) while receiving liquid acid catalyst through said first flow path;
   a first shut-off valve (50) operably located in said first conduit (49);
   a second conduit (66) for establishing a second flow path from said outlet of said make-up acid catalyst storage vessel (52) to said process vessel means (18);
   means (62, 64) for flowing liquid acid catalyst through said second flow path to said process vessel means; and
   a second shut-off valve (69) operably located in said second flow path.

3. The fluid handling apparatus in accordance with claim 2 wherein said transport vehicle unloading means (40) comprise:
   a source of compressed gas;
   means (42, 44) for connecting said source of compressed gas to a vapor valve (46) on said transport vehicle; and
   means for connecting said first conduit (49) to an eduction valve on said transport vehicle.

4. The fluid handling apparatus in accordance with claim 3 wherein the acid catalyst is hydrofluoric acid and the compressed gas is nitrogen gas.

5. The fluid handling apparatus in accordance with claim 1 wherein said first pressure level is greater than said second pressure level.

6. The fluid handling apparatus in accordance with claim 1 wherein said process vessel is a settler vessel (18).

7. A method for transferring a quantity of liquid acid catalyst for an alkylation process employing a make-up acid catalyst storage vessel (52) having a volume substantially less than the volume occupied by the total quantity of acid catalyst employed in said alkylation process, wherein acid catalyst from a transport vehicle containing liquid acid catalyst under vapor pressure is transferred at a second pressure level to a process vessel (18) at a first pressure level, said method comprising the steps of:
   temporarily isolating said make-up acid storage vessel (52) from said process vessel (18) while venting said make-up acid storage vessel;
   isolating said make-up acid storage vessel (52) from said transport vehicle (40) and discontinuing

venting of said make-up acid storage vessel;
unloading said quantity of make-up acid catalyst from said transport vehicle (40) at said second pressure level into said make-up acid storage vessel (52);
re-establishing a flow path from said make-up acid storage vessel (52) to said process vessel (18); and
pressure transferring said quantity of make-up acid catalyst from said make-up acid storage vessel (52) to said process vessel (18) at said first pressure level.

8. A method in accordance with claim 7 wherein said step of unloading said quantity of make-up acid catalyst from a transport vehicle comprises:
establishing a first flow path (49) from said transport vehicle (40) to said make-up acid storage vessel (52), and providing a first shut-off valve (50) therein;
establishing flow of liquid acid catalyst through said first flow path by pressuring said transport vehicle (40), while venting said make-up acid storage vessel (52); and
shutting off flow in said first flow path (49) after transferring said quantity of make-up acid catalyst.

9. A method in accordance with claim 8 wherein said step of pressure transferring said quantity of acid catalyst from said make-up acid storage vessel (52) to said process vessel (18) comprises:
establishing a second flow path (66, 70) from said make-up acid storage vessel (52) to said process vessel (18) associated with said alkylation process, and providing a second shut-off valve (69) therein;
establishing flow of liquid acid catalyst through said second flow path (66, 70) by pressuring said make-up acid catalyst storage vessel (52); and
thereafter shutting off flow in said second flow path after transferring said quantity of acid catalyst.

10. A method in accordance with claim 9 wherein the acid catalyst is hydrofluoric acid and the compressed gas is nitrogen.

11. A method in accordance with claim 7 wherein said first pressure level is substantially greater than said second pressure level.

Patentansprüche

1. Fluidhandhabungsvorrichtung, umfassend:
a) mit einer Alkylierungsanlage verbundene Arbeitsbehältereinrichtung (18), um einen flüssigen Säurekataly- sator bei einem ersten Druckniveau aufzunehmen;
b) Transportvorrichtungs-Entladeeinrichtung (40), die eine Druckzufuhr, Rohr- und Ventileinrichtungen (42, 44, 46) zum Entladen bei einem zweiten Druckniveau einer Transportvorrichtung, die flüssigen Säurekatalysator unter Dampfdruck enthält, umfaßt; und
c) Überführungseinrichtung zur Überführung des Säureka- talysators aus der Transportvorrichtung in die Arbeitsbehältereinrichtung (18),
dadurch gekennzeichnet, daß
d) ein mit der Alkylierungsanlage verbundener Zusatzsäurekatalysatorvorratsbehälter (52) bereitgestellt wird, der einen Einlaß und einen Auslaß aufweist und ein Volumen hat, das wesentlich geringer als das Volumen der Arbeitsbehältereinrichtung ist;
e) die Überführungseinrichtung Rohreinrichtungen (49, 66, 70) und Ventileinrichtungen (50, 69) umfaßt, die mit dem Zusatzkatalysatorvorratsbehälter zur Entladung des flüssigen Säurekatalysators aus der Transportvorrichtung bei dem zweiten Druckniveau und zur Überführung des flüssigen Säurekatalysators über das Zusatzkatalysatorvorratsbehälter (52), der als Druckschleusenkammer zu der Arbeitsbehältereinrichtung (18) bei dem ersten Druckniveau verwendet wird, verbunden sind.

2. Fluidhandhabungsvorrichtung nach Anspruch 1, wobei die Überführungseinrichtung folgende Bestandteile umfaßt:
ein erstes Rohr (49) zur Einrichtung eines ersten Strömungswegs von der Transportvorrichtungs-Entladeeinrichtung (40) zu dem Einlaß der Zusatzsäurekatalysatorvorratsbehältereinrichtung (52);
Einrichtungen (42, 46) für den Strom des flüssigen Säure- katalysators aus der Transportvorrichtung in den Zusatzsäurekatalysatorvorratsbehälter (52) über den ersten Strömungsweg;
Einrichtungen (54, 56) zum Ablassen von Gas aus dem Zusatzsäurekatalysatorvorratsbehälter (52), während er flüssigen Säurekatalysator über den ersten Strömungsweg aufnimmt;
ein erstes Absperrventil (50), das betriebsbereit in dem ersten Rohr (49) angeordnet ist;
ein zweites Rohr (66) zur Einrichtung eines zweiten Strömungswegs von dem Auslaß des Zusatzsäurekatalysatorvor- ratsbehälters (52) zu der Arbeitsbehältereinrichtung (18);
Einrichtungen (62, 64) für den Strom des flüssigen Säurekatalysators über den zweiten Strömungsweg in die Arbeitsbehältereinrichtung; und
ein zweites Absperrventil (69), das betriebsbereit

in dem zweiten Strömungsweg angeordnet ist.

3. Fluidhandhabungsvorrichtung nach Anspruch 2, wobei die Transportvorrichtungs-Entladeeinrichtung (40) folgende Bestandteile umfaßt:
eine Quelle für komprimiertes Gas;
Einrichtungen (42, 44) zum Verbinden der Quelle für das komprimierte Gas mit dem Dampfventil (46) an der Transportvorrichtung; und
eine Einrichtung zum Verbinden des ersten Rohres (49) mit einem Auslaßventil an der Transportvorrichtung.

4. Fluidhandhabungsvorrichtung nach Anspruch 3, wobei es sich bei dem Säurekatalysator um Flußsäure und bei dem komprimierten Gas um Stickstoffgas handelt.

5. Fluidhandhabungsvorrichtung nach Anspruch 1, wobei das erste Druckniveau höher als das zweite Druckniveau ist.

6. Fluidhandhabungsvorrichtung nach Anspruch 1, wobei es sich beim Arbeitsbehälter um einen Absetzbehälter (18) handelt.

7. Verfahren zum Überführen einer Menge eines flüssigen Säurekatalysators für ein Alkylierungsverfahren, bei dem ein Zusatzsäurekatalysatorvorratsbehälter (52) mit einem Volumen eingesetzt wird, das wesentlich geringer als das von der Gesamtmenge an Säurekatalysator, die in dem Alkylierungsverfahren eingesetzt wird, eingenommene Volumen ist, wobei der Säurekatalysator aus einer Transportvorrichtung mit einem Gehalt an flüssigem Säurekatalysator unter Dampfdruck bei einem zweiten Druckniveau in den Arbeitsbehälter (18) bei einem ersten Druckniveau überführt wird, wobei das Verfahren folgende Stufen umfaßt:
zeitweise Isolierung des Zusatzsäurevorratsbehälters (52) von dem Arbeitsbehälter (18), während Gas aus dem Zusatzsäurevorratsbehälter abgelassen wird;
Isolierung des Zusatzsäurevorratsbehälters (52) von der Transportvorrichtung (40) und Beendigung des Ablassens von Gas aus dem Zusatzsäurevorratsbehälter;
Umladen der Menge an Zusatzsäurekatalysator von der Transportvorrichtung (40) bei dem zweiten Druckniveau in den Zusatzsäurevorratsbehälter (52);
erneute Einrichtung eines Strömungswegs vom Zusatzsäurevorratsbehälter (52) zum Arbeitsbehälter (18); und
Überführung durch Druck einer Menge von Zusatzsäurekata- lysator aus dem Zusatzsäurevorratsbehälter (52) in den Arbeitsbehälter (18) bei dem ersten Druckniveau.

8. Verfahren nach Anspruch 7, wobei die Stufe der Entladung der Menge an Zusatzsäurekatalysator aus der Transportvorrichtung folgendes umfaßt:
Einrichtung eines ersten Strömungswegs (49) von der Transportvorrichtung (40) zum Zusatzsäurevorratsbehälter (52) und Bereitstellung eines ersten Absperrventils (50) darin;
Einrichtung eines Stroms von flüssigem Säurekatalysator über den ersten Strömungsweg, in dem der Druck in der Transportvorrichtung (40) erhöht wird, während Gas aus dem Zusatzsäurevorratsbehälter (52) abgelassen wird;
Absperren des Stroms über den ersten Strömungsweg (49) nach Überführung der Menge an Zusatzsäurekatalysator.

9. Verfahren nach Anspruch 8, wobei die Stufe der Überführung unter Druck der Menge an Säurekatalysator aus dem Zusatzsäurevorratsbehälter (52) in den Arbeitsbehälter (18) folgende Stufen umfaßt:
Einrichtung eines zweiten Strömungswegs (66, 70), von dem Zusatzsäurevorratsbehälter (52) zum Arbeitsbehälter (18), der mit der Alkylierungsanlage verbunden ist, und Bereitstellung eines zweiten Absperrventils (69) darin;
Einrichtung eines Stroms von flüssigem Säurekatalysator über den zweiten Strömungsweg (66, 70), in dem der Druck im Zusatzsäurekatalysatorvorratsbehälter (52) erhöht wird;
anschließendes Absperren des Stroms über den zweiten Strömungsweg nach Überführung der Menge an Säurekatalysator.

10. Verfahren nach Anspruch 9, wobei es sich bei dem Säurekatalysator um Flußsäure und bei dem komprimierten Gas um Stickstoff handelt.

11. Verfahren nach Anspruch 7, wobei das erste Druckniveau wesentlich höher als das zweite Druckniveau ist.

Revendications

1. Une installation de manipulation de fluides, comprenant :
(a) des moyens formant caisson de processus (18), associés à un processus d'alkylation pour contenir un catalyseur acide liquide à un premier niveau de pression,
(b) des moyens de déchargement d'un véhicule de transport (40), comprenant des moyens formant alimentation de pression, conduite et vanne (42, 44, 46), pour décharger à un second niveau de pression un véhicule

de transport contenant un catalyseur acide liquide sous pression de vapeur; et

(c) des moyens de transfert, pour transférer le catalyseur acide de ce véhicule de transport aux moyens formant caisson de processus (18),

caractérisée en ce que :

(d) il est prévu un caisson de stockage de catalyseur acide d'appoint (52) associé au processus d'alkylation, possédant une entrée et une sortie et présentant un volume notablement inférieur au volume des moyens formant caisson de processus,

(e) les moyens de transfert comprennent des moyens formant conduite (49, 66, 70) et des moyens formant vanne (50, 69) reliés à ce caisson de stockage de catalyseur d'appoint pour décharger le catalyseur acide liquide depuis le véhicule de transport au second niveau de pression et pour faire passer le catalyseur acide liquide via le caisson de stockage de catalyseur d'appoint (52) utilisé comme chambre d'arrêt de pression vers les moyens formant caisson de processus (18) au premier niveau de pression.

2. L'installation de manipulation de fluides selon la revendication 1, dans laquelle les moyens de transfert comprennent:

une première conduite (49), pour établir un premier trajet d'écoulement depuis les moyens de déchargement du véhicule de transport (40) jusqu'à l'entrée des moyens formant caisson de stockage de catalyseur acide d'appoint (52);

des moyens (42, 46) pour faire s'écouler le catalyseur acide liquide depuis le véhicule de transport jusqu'au caisson de stockage de catalyseur acide d'appoint (52) le long de ce premier trajet d'écoulement;

des moyens (54, 56) pour mettre à l'air libre le caisson de stockage de catalyseur acide d'appoint (52) lors de la réception du catalyseur acide liquide par ledit premier trajet d'écoulement;

une première vanne de coupure (50) située de manière actionnable dans ladite première conduite (49);

une seconde conduite (66) pour établir un second trajet d'écoulement depuis ladite sortie du caisson de stockage de catalyseur acide d'appoint (52) jusqu'aux moyens formant caisson de processus (18);

des moyens (62, 64) pour faire s'écouler le catalyseur acide liquide le long de ce second trajet d'écoulement jusqu'aux moyens formant caisson de processus ; et

une seconde vanne de coupure (69) située de manière actionnable dans ledit second trajet d'écoulement.

3. L'installation de manipulation de fluides selon la revendication 2, dans laquelle les moyens de déchargement du véhicule de transport (40) comprennent:

une source de gaz comprimé;

des moyens (42, 44) pour relier cette source de gaz comprimé à une vanne de vapeur (46) sur ledit véhicule de transport; et

des moyens pour relier ladite première conduite (49) à une valve d'éduction sur ce véhicule de transport.

4. L'installation de manipulation de fluides selon la revendication 3, dans laquelle le catalyseur acide est l'acide fluorhydrique et le gaz comprimé est l'azote gazeux.

5. L'installation de manipulation de fluides selon la revendication 1, dans laquelle le premier niveau de pression est supérieur au second niveau de pression.

6. L'installation de manipulation de fluides de la revendication 1, dans laquelle ledit caisson de processus est un caisson décanteur (18).

7. Un procédé pour transférer une certaine quantité de catalyseur acide liquide pour un processus d'alkylation utilisant un caisson de stockage de catalyseur acide d'appoint (52) avec un volume notablement supérieur au volume occupé par la quantité totale de catalyseur acide employée dans ce processus d'alkylation, dans lequel le catalyseur acide provenant d'un véhicule de transport contenant le catalyseur acide sous pression de vapeur est transféré à un second niveau de pression vers un caisson de processus (18) à un premier niveau de pression, ce procédé comprenant les étapes consistant à :

isoler temporairement le caisson de stockage d'acide d'appoint (52) du caisson de processus (18) tout en mettant à l'air libre le caisson de stockage d'acide d'appoint ;

isoler le caisson de stockage d'acide d'appoint (52) du véhicule de transport (40) et mettre fin à la mise à l'air libre du caisson de stockage d'acide d'appoint;

décharger ladite quantité de catalyseur acide d'appoint depuis le véhicule de transport (40) au second niveau de pression jusque dans le caisson de stockage d'acide d'appoint (52);

rétablir un trajet d'écoulement depuis le caisson de stockage d'acide d'appoint (52) jusqu'au caisson de processus (18); et

transférer sous pression ladite quantité de catalyseur acide d'appoint depuis le caisson de

stockage d'acide d'appoint (52) jusqu'au caisson de processus (18) au premier niveau de pression.

8. Un procédé selon la revendication 7, dans lequel l'étape de déchargement de ladite quantité de catalyseur acide d'appoint depuis un véhicule de transport comprend les étapes consistant à:

établir un premier trajet d'écoulement (49) depuis ce véhicule de transport (40) jusqu'au caisson de stockage d'acide d'appoint (52), et y prévoir une première vanne de coupure (50);

établir un courant de catalyseur acide liquide le long de ce premier trajet d'écoulement en mettant sous pression le véhicule de transport (40), tout en mettant à l'air libre le caisson de stockage d'acide d'appoint (52); et

couper l'écoulement dans le premier trajet d'écoulement (49) après avoir transféré ladite quantité de catalyseur acide d'appoint.

9. Un procédé selon la revendication 8, dans lequel l'étape de transfert sous pression de ladite quantité de catalyseur acide depuis le caisson de stockage d'acide d'appoint (52) jusqu'au caisson de processus (18) comprend les étapes consistant à:

établir un second trajet d'écoulement (66, 70) du caisson de stockage d'acide d'appoint (52) au caisson de processus (18) associé au processus d'alkylation, et y prévoir une seconde vanne de coupure (69);

établir un courant de catalyseur acide liquide le long de ce second trajet d'écoulement (66, 70) en mettant sous pression le caisson de stockage de catalyseur acide d'appoint (52); et

couper ensuite l'écoulement dans le second trajet d'écoulement après avoir transféré ladite quantité de catalyseur acide.

10. Un procédé selon la revendication 9, dans lequel le catalyseur acide est l'acide fluorhydrique et le gaz comprimé est l'azote.

11. Un procédé selon la revendication 7, dans lequel ledit premier niveau de pression est notablement supérieur audit second niveau de pression.

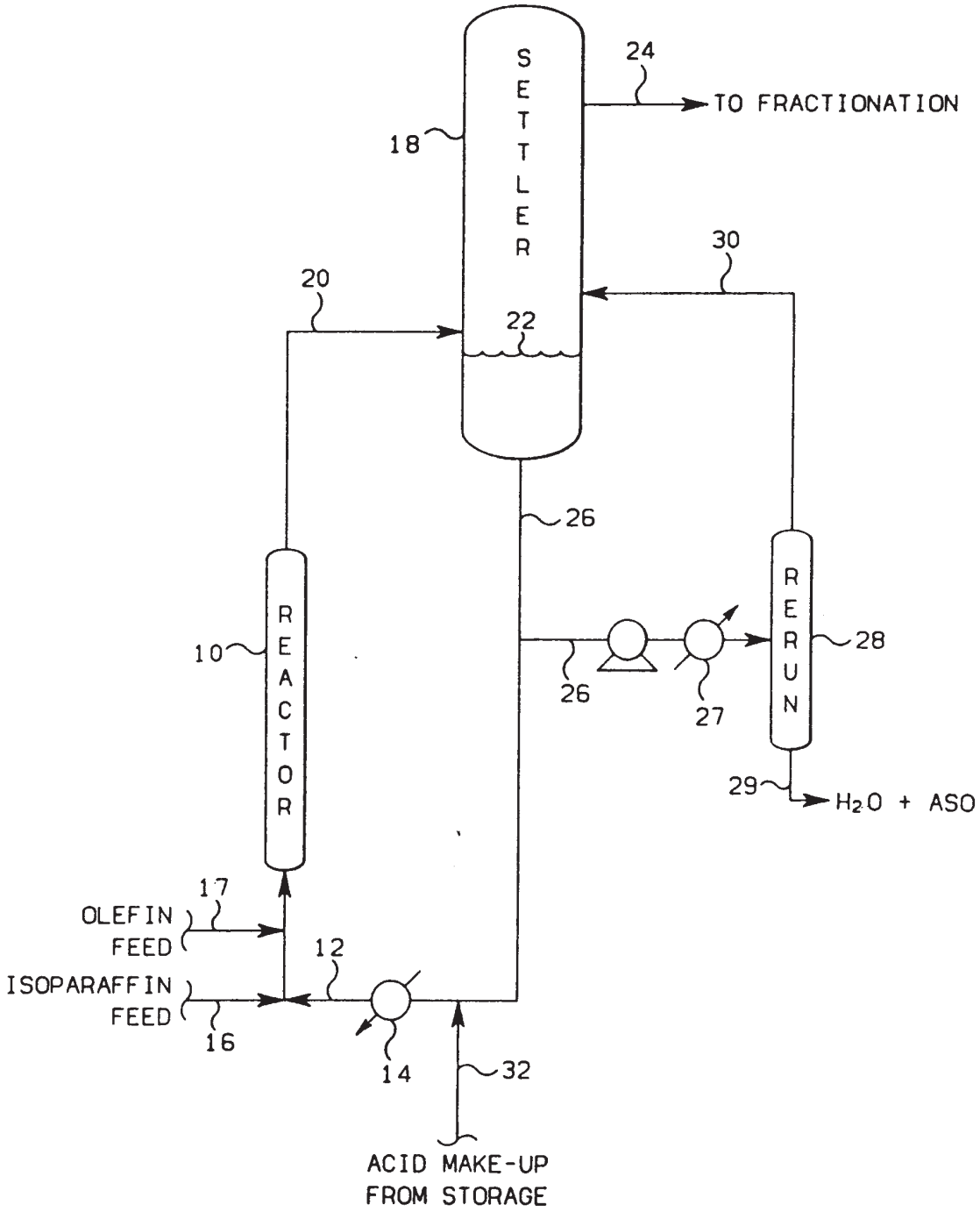
SETTLER
18
24
TO FRACTIONATION
30
20
22
26
REACTOR
10
RERUN
28
26
27
29
H_2O + ASO
17
OLEFIN FEED
12
ISOPARAFFIN FEED
16
14
32
ACID MAKE-UP FROM STORAGE

FIG. 1

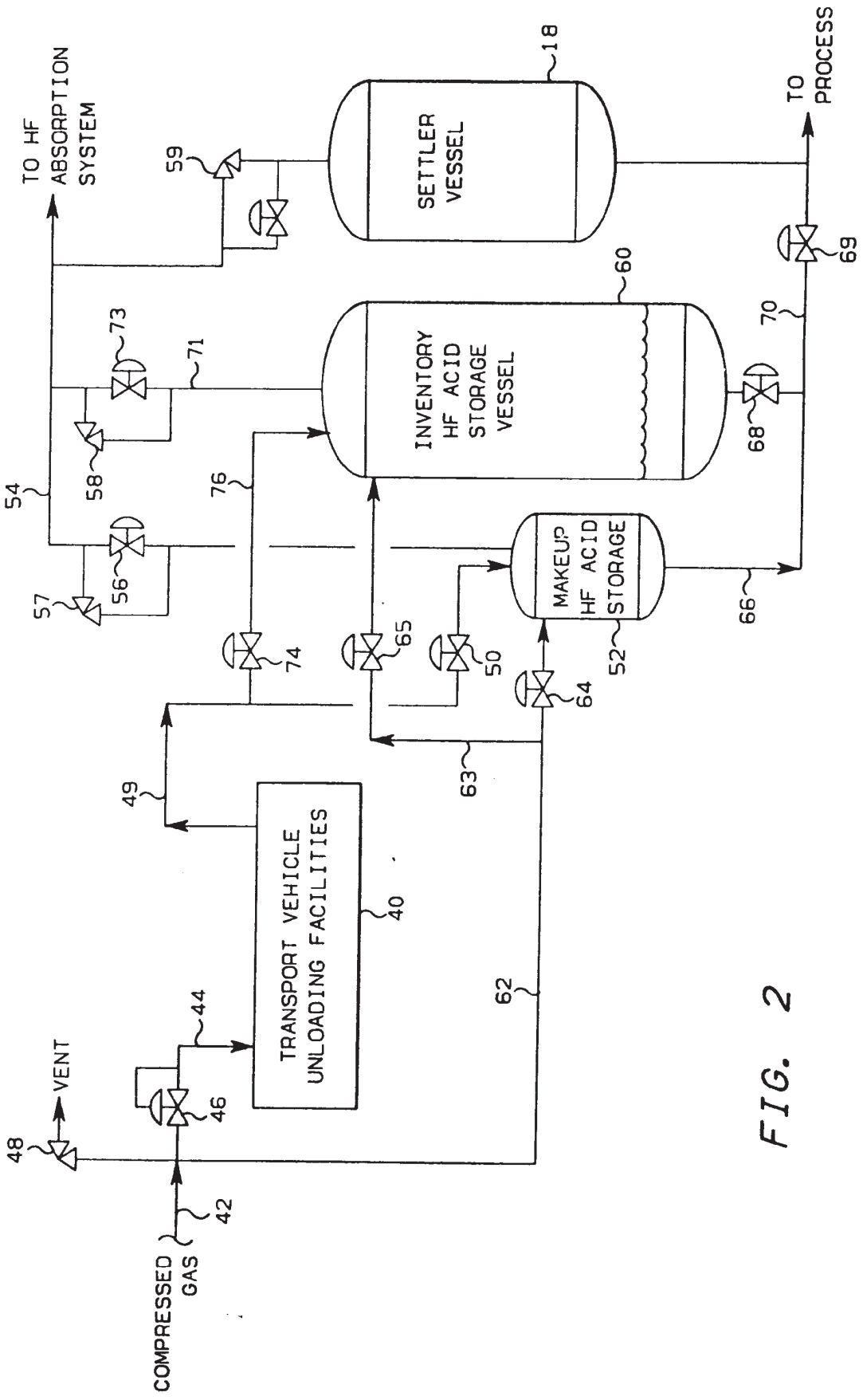
TO HF ABSORPTION SYSTEM
SETTLER VESSEL
18
TO PROCESS
59
69
60
INVENTORY HF ACID STORAGE VESSEL
70
73
71
68
58
54
76
MAKEUP HF ACID STORAGE
57
56
66
74
65
50
52
64
49
63
TRANSPORT VEHICLE UNLOADING FACILITIES
40
62
44
VENT
46
48
42
COMPRESSED GAS

FIG. 2

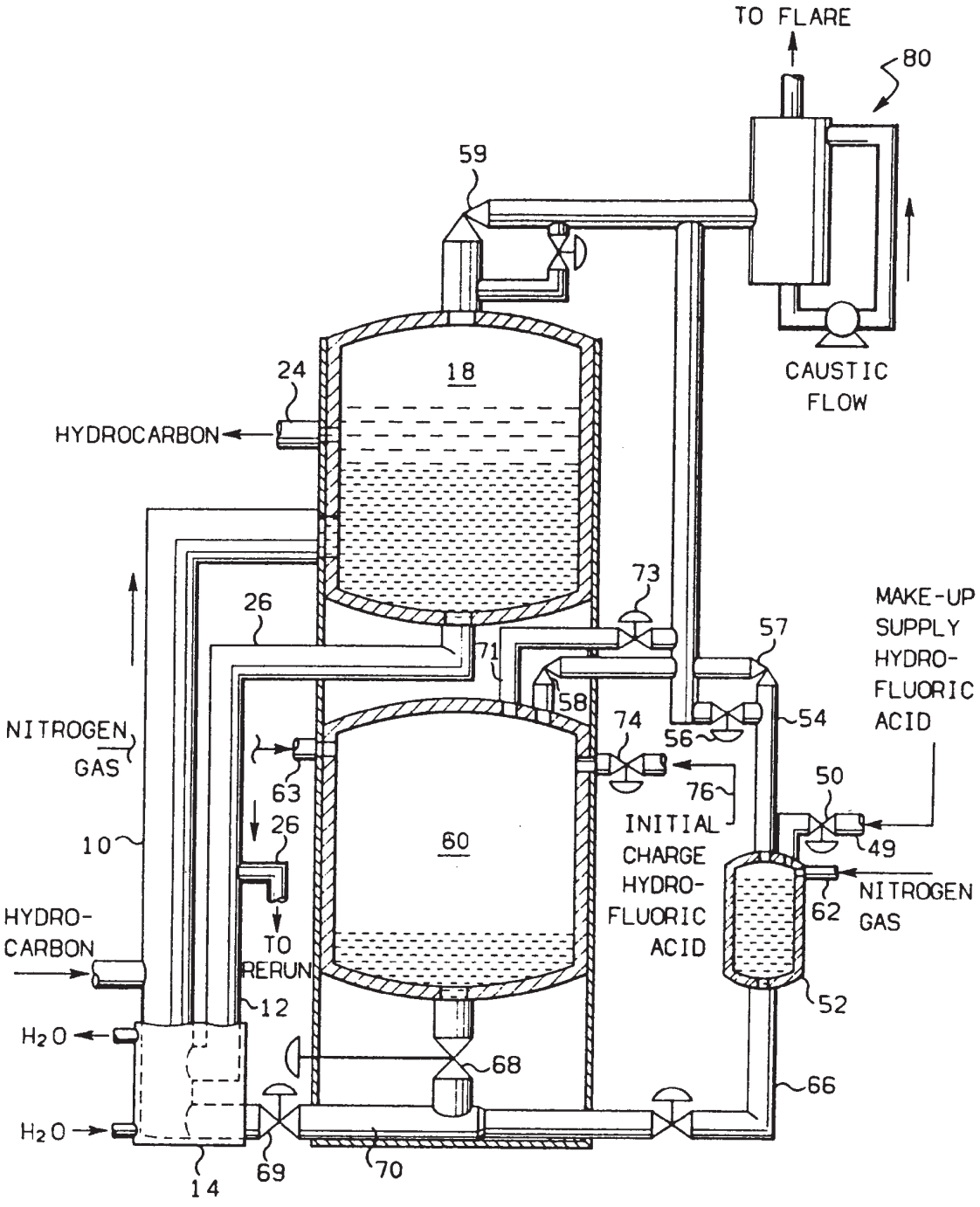
TO FLARE
80
59
CAUSTIC
FLOW
24
18
HYDROCARBON
73
26
57
MAKE-UP
SUPPLY
HYDRO-
FLUORIC
ACID
71
58
74
56
54
NITROGEN
GAS
63
76
50
26
INITIAL
CHARGE
HYDRO-
FLUORIC
ACID
10
60
49
NITROGEN
GAS
62
HYDRO-
CARBON
TO
RERUN
12
52
H2O
68
66
H2O
14
69
70

FIG. 3