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SAFE HANDLING OF ACETYLENE UNDER PRESSURE

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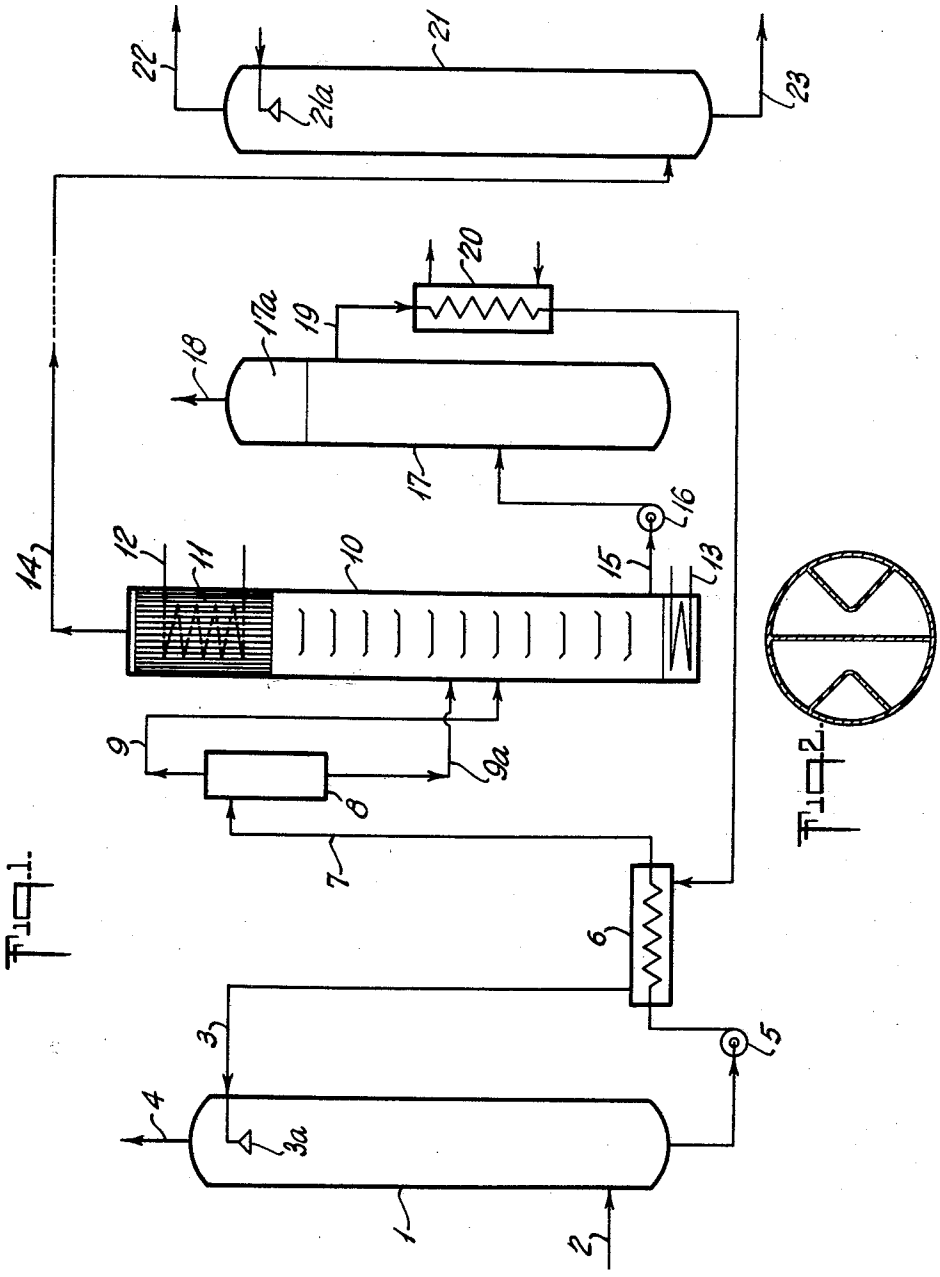


Fig. 1.

Fig. 2.

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SAFE HANDLING OF ACETYLENE UNDER PRESSURE

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This case relates to the safe handling and transportation of acetylene gas under pressure and, more particularly, to admixing the acetylene with ammonia for obtaining a stable and non-explosive mixture for the handling or transporting or piping under pressure in the gaseous phase as from the point of production of the acetylene to the point of use thereof.

As is well understood, particularly because of the triple bond between the two carbon atoms in acetylene gas, this material possesses great chemical reactivity. Whereas this characteristic makes acetylene extremely desirable and as a starting material for numerous chemical syntheses and other reactions, it also imparts to acetylene and the use thereof very grave problems of safety, avoiding explosions, etc., particularly if it is desired to handle or utilize acetylene under relatively high conditions of temperature and pressure, as is frequently desired. For example, as is well understood, under a pressure of no more than slightly in excess of one atmosphere, pure acetylene is readily ignited into an explosive decomposition into its constituent elements by even a slight electric spark or electrostatic charges arising from flow friction in the handling thereof, etc., and this instability, although making the material desirable for many chemical reactions, inevitably, also, restricts or renders tremendously more expensive the desired utilization thereof.

If it is attempted to ameliorate various of the foregoing conditions by such expedients as, for example, diluting the acetylene gas with various gaseous diluents (e.g., hydrogen, nitrogen, ethylene, carbon monoxide, methane, or other organic vapors), difficulties may still be experienced in obtaining a stabilized acetylene under rather high pressures. For example, it may be necessary to admix with the acetylene substantial amounts of gaseous diluent and then bring the resulting mixture to the desired high pressure by means of a compressor which, not only may have to be designed for pressures substantially higher than normally employed compressing inflammable gases, but in which may lead to premature explosion of the mixture being treated. Thus, if it is attempted to produce a stabilized acetylene product under pressure by contacting low pressure acetylene with a normally liquid organic material having high vapor tension at a temperature at which the acetylene ultimately becomes saturated with organic vapor and then compressing the resultant gaseous mixture, still the safety problems are encountered and, also, the difficulty of obtaining the acetylene component of the mixture at a desirably high pressure, with, of course, the corresponding difficulty of obtaining even higher pressure on the mixture. Moreover, the additional energy consumed in compression due to the presence of the diluent gas may be an undesirable economic factor, and the ultimate separation of acetylene from diluent to release pure acetylene for ultimate use, may introduce other undesirable technological or economic factors, such as the additional requirement of special apparatus for effecting such separation, etc.

By the same token, if it is attempted to transport pure acetylene under high pressure over substantial distances as, for example, in nests of very narrow tubes, or in conventional pipes filled with Raschig rings or other types of packing, or in pipes through which the acetylene

entrains a suspension of finely divided solid particles or packing, still additional economic and technical difficulties or limitations may be encountered. As will be understood, of course, acetylene can be transported through pipes and otherwise at relatively low pressure without inordinant danger, but, particularly in large chemical plants utilizing large volumes of acetylene desirably under high pressure, such low pressure piping or transportation of the gas may be completely uneconomical, and such a situation may become critical (even with merely piping acetylene from a producing unit therefor in one part of the chemical plant to another synthetic chemical unit in aonther part of the same plant where the acetylene is to be used in a chemical reaction) because, among other reasons as will be understood, in a large modern synthetic chemical plant, such transportation of a raw material from the producing unit in one part of the plant to another unit in another part of the plant could very well call for a running length of pipe of a mile or much more.

According to the present invention, however, provision is made for the safe handling of gaseous acetylene under substantial high pressure by the admixture thereof with anhydrous ammonia with the gaseous acetylene being dissolved in liquid anhydrous ammonia so that the pressurizing or compressing of the mixture may obtain in the liquid solution phase, rather than all in the gaseous phase, to obtain the desired high-pressure gaseous mixture of stabilized proportions of acetylene and ammonia, which mixture can be handled safely and readily transported at high pressure even through ordinary pipes, and then, if desired, separated at the utilizing destination to yield both substantially pure acetylene and ammonia for re-use in the transportation of a further quantity of acetylene, and low pressure acetylene as dissolved in a liquid phase by a pump produces a situation utilizing relatively inexpensive and simple apparatus and under safety conditions higher than would obtain if the compression and other handling were all in a gaseous phase, yet produces a final gaseous mixture which is stable against explosion and ignition under conventional conditions at the substantially higher pressures desired.

With the foregoing and other objects in view, this invention will now be described with regard to a particular embodiment thereof, and other objects and advantages will be apparent from the following description, the accompanying drawing, and the appended claims.

In the drawing:

FIG. 1 is a schematic or diagrammatic showing, somewhat in flow sheet form, of the various steps and apparatus elements embodying and for practicing this invention; and

FIG. 2 is a schematic or diagrammatic showing of a cross section of a preferred configuration for the individual tubes in a nest-of-tubes condenser in the apparatus of FIG. 1.

As generally illustrative of a preferred process or sequence of steps embodying and for carrying out this invention, acetylene gas, under normal (and relatively safe) temperature and pressure conditions is dissolved in cold anhydrous liquid ammonia, preferably by countercurrent contact in a tray-type solution tower or column to form an ammoniacal solution of acetylene. The inevitable heat of solution of the acetylene gas in the ammonia and the reduction, in such apparatus, of the partial pressure of the ammonia, cause the vaporization of a portion of the liquid ammonia, with resulting cooling, in such manner that the vaporization substantially regulates temperature at which the dissolving normally operates. For example, under atmospheric pressure in such a solution column, the average temperature of the countercurrent column or tower is stabilized at approximately —30° C., under which conditions, theoretically, about one volume of am-

monia will dissolve about 125 volumes of acetylene gas.

Preferably the relative proportions of acetylene gas and liquid ammonia introduced into the solution step are regulated so that substantially all the acetylene gas introduced is dissolved in the liquid ammonia, in the counter-current gas-liquid phase contacting solubilizing step, so that the only effluent gaseous phase is ammonia gas substantially free of acetylene gas. Actually, satisfactory results are achieved in practice with, approximately, 5.5 kg. anhydrous liquid ammonia being employed for each 1 kg. of acetylene gas, so that, generally, the ammoniacal solution resulting from the solution step contains, approximately, 15% by weight of acetylene. A more concentrated ammoniacal solution of acetylene may, satisfactorily, be obtained by reducing the temperature of the countercurrent solution step in the tower or other apparatus being involved as by external cooling of the apparatus in which the solution step is produced; i.e., as will be understood, the dissolving power of liquid ammonia for acetylene gas increases according to a decrease of the temperature in the dissolving step.

With the acetylene gas dissolved in a liquid phase of anhydrous ammonia, the various fears or precautions with regard to handling acetylene gas at high pressure do not become so important. For example, the ammoniacal solution of acetylene gas in liquid ammonia from the dissolving step can be readily pumped and/or compressed (at a pressure of more than, for example, 15 kg./cm.^{2}) with a regular liquid pump, without regard to the disadvantages inherent in attempting so to compress a gaseous phase mixture of acetylene and a diluent to high pressure and, generally, with less complicated or conventional apparatus. Such liquid phase ammoniacal acetylene solution is then, satisfactorily, passed (with previous cooling in a heat exchanger if desired) into a degasifying apparatus or stripping tower for further concentration or treatment, in which, near the entrance to the degasifying or stripping step, some heating may be provided to raise the temperature of the cooled ammoniacal solution moderately (and by the utilization of warm water, the temperature of which will depend, as noted below, upon, among other factors, the height in a degasifying or stripping tower or, column at which the ammoniacal solution is introduced).

In such step, a gaseous mixture of acetylene and ammonia vaporized from the ammoniacal solution is produced with the upper portion of the tower or latter portion of reaction in the degasifying and stripping step being used to increase the percentage or proportion of acetylene gas in the gaseous mixture of acetylene and ammonia vapor evolved from the ammoniacal solution of acetylene in liquid ammonia, while the lower portion of such a tower is satisfactorily used to remove acetylene gas from the residual ammoniacal solution of acetylene in liquid phase—to the end that substantially pure ammonia is obtained at one outlet from the degasifying or stripping step (e.g., at the bottom of a degasifying or stripping tower) while a gaseous mixture of increased proportion of acetylene in ammonia vapor and in a stabilized condition for transportation, in pipe lines or otherwise to the point of use of the acetylene is obtained at the other end of the degasifying and stripping step. It is to be understood, from the foregoing, that the substantially pure ammonia obtained from the degasifying and stripping step is re-cycled and available for use in the liquid ammonia solution step, while any acetylene gas removed therefrom is also separately returned to be re-dissolved in liquid ammonia, the desired product of the degasifying and solution step being a gaseous (not liquid) phase admixture of acetylene gas and ammonia vapor in an already compressed high pressure condition, but stabilized against explosion, for the transportation thereof as may be desired.

A further concentration of the acetylene in the gaseous acetylene-ammonia mixture or gaseous phase may be, satisfactorily, carried out after or as a part of the degasifying and stripping step (for example, at the top portion of the degasifying or stripping column) by partially condensing the gaseous ammonia, as by controlling the temperature of the cooling thereof as in a condenser with a coolant of controllable temperature. Thus, the condensed ammonia gas can be re-fluxed back through the degasifying or stripping step, for increasing the concentration of acetylene gas in the gaseous phase effluent from the stripping step to provide, as may be desired, a maximal concentration of acetylene gas in the acetylene-ammonia gaseous mixture commensurate with the stable proportioning of these two constituents, it being understood that the proportion thereof in such a gaseous mixture which is desirably stable is a function of the final pressure on the mixture and/or at which the acetylene is to be transported and/or used, all as noted in more detail below.

Referring, now, to the drawings depicting or illustrating one satisfactory or preferred embodiment of the apparatus and method steps and sequence of operation embodying and for practicing this invention, it may be noted as illustrative of the invention, that a column or tower **1** is illustrated, preferably as having bubble trays therein, into which acetylene gas is introduced through conduit **2** as from a producing unit for acetylene gas and at the usual low and safe or normal pressure thereof, while liquid anhydrous ammonia is introduced into column **1** through conduit **3**, in known manner as by a sprayhead **3***a* in the upper portion thereof, for passing the upwardly rising acetylene gas in column **1** into countercurrent flow contact with the downwardly passing liquid ammonia from conduit **3** and sprayhead **3***a*.

During such countercurrent step or operation, gaseous acetylene produced through conduit **2** is dissolved in the liquid ammonia introduced through conduit **3** and sprayhead **3***a* with the aid of, in known manner, the various trays or "bubble caps" (not shown) in column **1** in known manner, and the liquid ammonia reduced into column **1** through conduit **3** and sprayhead **3***a*, as hereinafter described, is at the low temperature of, satisfactorily, of about −60° C. As will be understood, upon dissolving acetylene gas in such cold liquid ammonia, the heat of solution causes a certain vaporization of a portion of the liquid ammonia phase with, of course, reduction in temperature due to the heat of vaporization of the ammonia so that the temperature in column **1** may fall, satisfactorily, to −70° C., even though, when starting, the temperature of the column is approximately −30° C.

In any case, the proportions or flow rates of the acetylene gas and the liquid ammonia into column **1**, as well as the respective starting and resultant temperatures thereof, are, preferably, controlled so that there is sufficient liquid anhydrous ammonia introduced into column **1** to dissolve completely the quantity of acetylene gas introduced thereto under the particular conditions of temperature and pressure which obtain so that, for example, the only gaseous phase exiting from the countercurrent dissolving step in column **1** through conduit **4** at the top thereof consists primarily or substantially only of ammonia.

At the bottom of column **1**, there is produced the desired solution of acetylene gas in liquid anhydrous ammonia, and containing, 10%–15% concentration of acetylene, or, for the particular conditions being described with regard to the illustrated embodiment, a solution containing approximately 700 kg./hr. of acetylene and 770 kg./hr. of ammonia at −70° C.

From the bottom of column **1**, such ammoniacal solution of acetylene is pumped by pump **5** (and compressed, still in the liquid phase, to a pressure of about 16 kg./cm.^{2}) through heat exchanger **6**, where the low temperature of the ammoniacal solution is utilized as a coolant for recovered ammonia from later steps in the process as will be described below, where the temperature of the ammoniacal solution of acetylene is raised to approx-

imately 25° C. and is then conducted, through conduit 7, into a separator 8 where vapor and liquid phases are allowed to separate. Whatever small amount of gaseous acetylene separates from the liquid phase ammoniacal solution in separator 8 is conducted, as through conduit 9, for introduction into a stripping column 10, while the liquid phase of the ammoniacal solution from separator 8 is introduced into column 10, and through conduit 9a, but at a level in column 10 somewhat above the level at which the gaseous phase from separator 8 was introduced through conduit 9.

Preferably, column 10—which has for its primary purpose the degasifying or stripping (with condensate reflux) of a gaseous mixture of ammonia and acetylene from the ammoniacal solution of acetylene—is of the tray type of column, and is heated at the bottom to a certain extent by circulation of water at, for example, 50° C. through a water circulating heating coil 13. Also, stripping column 10 is topped by a portion indicated at 11 and comprising a bundle or nest of tubes, in the form of a cooled condenser, the cooling effect or apparatus of which is indicated at 12.

As will be noted, the ammoniacal liquid phase solution from separator 8 is introduced into column 10 about midway along the height thereof through conduit 9a and just slightly above the height or level of introduction of a gaseous phase from separator 8 from conduit 9, and, also as indicated in the drawing, the upper trays or "bubble caps" of column 10 above the level of point of introduction of both the liquid and gaseous phases through conduits 9 and 9a, are preferably provided with a packing or filling such as, for example, Raschig rings, for an added safety measure due to the fact that the gaseous phase in the upper portion of column 10 is progressively becoming enriched with acetylene as the stripping step progresses.

Thus, substantially all the acetylene from the ammoniacal solution and a portion of gaseous ammonia are freed or stripped in column 10 as a gaseous phase from the liquid solution is introduced thereinto. That portion of the gaseous phase of ammonia admixed with the gaseous acetylene (and the pressure on this gaseous phase) is controlled, satisfactorily and primarily, by adjusting the temperature of the condenser portion 11—12 at the top of the column 10, with due regard, of course, to the desired gas pressure ultimately to emerge from the top of column 10 through conduit 14 thereof and also with regard to the proportion or extent of refluxing of a liquid phase back down stripping tower 10, which is, as will be understood, also controlled to a certain extent by regulation of the temperature in heating coil 13 at the bottom of column 10.

For example, satisfactory results are achieved by keeping the temperature of condenser 11—12 in the range of 16° C., whereby there is obtained a gaseous phase at a pressure of about 13 atmospheres, consisting of about 670 kg./hr. of acetylene and 670 kg./hr. of ammonia ejected or flowing out of conduit 14, under the aforementioned conditions. It should also be noted that, preferably, the cross section of the several individual tubes of the bundle or nest of tubes 11 comprising condenser 12 is as shown in FIG. 2 with a plurality of longitudinal metallic partitions therein disposed, as indicated in FIG. 2, so as to obtain, preferably, a maximum hydraulic diameter with regard to the effluence of column 10, in terms of the refluxing of a portion of the liquid phase from the condenser 11—12, etc., said hydraulic diameter being, as will be understood, calculated by the formula $d=4S/P$, in which formula S represents the surface of the cross section of the individual tubes of tube bundle 11, while P represents the periphery of the surfaces wetted by the refluxing material, in this case condensed ammonia liquid returning downwardly in tubes 11 and column 10 having been condensed, after evaporation, by the condenser coolant circulated through the nest of tubes 11 by cooling coil 12.

Emerging from the top of stripping or degasifying column 10 and through the bundle of tubes and condenser portion 11—12 thereof by conduit 14 is the desired ammonia-acetylene gaseous mixture at the desired high pressure thereof, for conducting through conduit 14 to the ultimate point of use of the acetylene gas. For example, under the aforementioned illustrative conditions, conduit 14 may have an internal diameter of 50 mm. and extend for a length of several kilometers or more with satisfactory results in the transporting of high pressure acetylene without danger of ignition, explosion, etc., in accordance with and illustrative of this invention and the advantages thereof.

From the bottom of degasifying or stripping column 10 is withdrawn, through conduit 15, liquid ammonia from which a certain amount of ammonia vapor and substantially all the acetylene gas has been stripped in column 10. For example, under the above illustrative conditions, some 7060 kg./hr. of liquid ammonia may be withdrawn from the bottom of column 10 through conduit 15 and subjected to a pressure of, for example, 15 kg./cm.^{2} by pump 16, and is then introduced into a conventional distilling column 17, the bottom of which is maintained at a raised temperature of, for example 55° C., by well understood means not shown.

At the top of distilling column 17 is provided with a condenser (indicated at 17a) in known manner, and any gaseous or vaporized acetylene and ammonia vapors leaving the top of distilling column 17, as through conduit 18, are washed with water to remove residual ammonia and the resulting pure acetylene gas (at relatively low pressure) is returned, as will be understood, through conduit 18 back to be re-introduced into the bottom of solution column 1 for re-dissolving in additional liquid ammonia, etc. The condensed or gaseous ammonia in distilling column 17 is withdrawn in the upper portion thereof (but below condenser 17a), as through conduit 19, and is cooled in a heat exchanger 20 (through which coolant water is circulated at, satisfactorily, about 25° C.) and is then conducted through heat exchanger 6 (for the purpose of warming the solution of acetylene gas in ammonia emerging from the bottom of column 1) and is returned, through conduit 3 and sprayhead 3a, into column 1 for dissolving additional portions of acetylene gas in the ammonia for a re-cycling or repetition of the above noted steps.

The gaseous mixture of gaseous ammonia and acetylene (as contrasted with the liquid ammonia just described) is conducted, as previously noted, through conduit 14 to the ultimate place of utilization of the acetylene—as, for example, a remote synthetic chemical reactor or reaction unit, where, should it be desired to obtain the acetylene in the pure state and separate it from the ammonia vapor admixed therewith during transportation thereof, it is satisfactorily and readily introduced into a washing column 21 where the gaseous mixture is sprayed with water from a conduit and sprayhead 21a to wash therefrom, in known manner, the ammonia component of the gaseous mixture, thereby producing at the top of washing column 21 an effluent of substantially pure acetylene gas through conduit 22 for direct conducting to the ultimate point of use and, as will be understood, a water solution of ammonia at the bottom of column 21, which is preferably conducted, as through conduit 23, to conventional distillation apparatus for recovering of ammonia from the water solution.

In accordance with the foregoing illustrative operating conditions, satisfactory results are achieved with the introduction of water into washing column 21 at the rate of approximately 3 m.^{3}/hr., producing out of the top of washing column 21 an effluent of substantially pure acetylene through conduit 22 at the rate of about 665 kg./hr. (or 570 m.^{3}/hr.) with, of course, about 3 m.^{3}/hr. of an aqueous solution of ammonia containing approximately 225 gm./liter, at the bottom of column 21 out conduit 23.

As will be understood, of course, and particularly in

considering the purely illustrative example described above, various different desired mixtures of acetylene and ammonia gas may be produced in accordance with this invention and, indeed, the particular stability of the admixture produced for transportation may vary substantially in accordance with the conditions of transportation desired, the particular pressure under which the acetylene is to be maintained, and other considerations. It is to be understood, of course, that the limit of stability of the compressed acetylene gas, for any given pressure, is a function of the weight ratio or proportioning of the gaseous acetylene and ammonia components of the mixture. For example, it has been determined that satisfactory results are obtained in producing satisfactorily stable mixtures of acetylene and ammonia gas in the respective proportions at the respective pressure noted in the following table:

Composition of the mixture (percent by weight)		Limit of stability (Fressure), Atmospheres
C_2H_2	NH_3	
50	50	13
45	55	16
40	60	20
20	80	50

Thus, for example, as further illustrative of the foregoing, satisfactory results are obtained for an ammoniacal solution containing about 15% by weight of dissolved acetylene with the use in degasifying and stripping tower **10** of, about 20 trays, with the tower being maintained under pressure of about 16 atmospheres, and with the lower portion of the tower (through heating coil **13**) being heated to about 40° C. Under such conditions, with the top or condenser portion **11—12** of column **10** having a maintained temperature of about 35° C., there is satisfactorily recovered a gaseous mixture of about 25% by weight of acetylene and 75% by weight of ammonia, although, as noted the acetylene concentration of such gaseous mixture is satisfactorily increased by condensing and refluxing the ammonia vapor component as by maintaining the temperature of condenser **11—12** at a temperature of about 20° C. with, as noted, refluxing the condensed ammonia, so that, generally in accordance with the foregoing, there may be obtained satisfactorily a gaseous mixture of acetylene and ammonia in conduit **14** having the approximate proportions by weight of 55% ammonia and 45% acetylene, for conducting or transporting, as noted, through conventional pipe lines at high pressures (with the avoidance, of course, of utilization of such materials as copper, silver, and/or other metals in the pipe lines with which acetylene normally and readily forms dangerous or explosive acetylides).

As will be understood, instead of removing the gaseous ammonia from the acetylene-ammonia gas mixture in a washing tower **21**, the ammonia may be removed by reaction with an acid reagent in a thermally stabilized device to produce the corresponding ammonia salt and liberate from the gaseous mixture substantially pure acetylene, and, even with the use of a water wash in washing tower **21**, it may be desired or preferred to incorporate with the conventional washing tower **21**, as will be understood, a cooling device for the purpose of dissipating the heat of solution of ammonia in the washing water, the coolant of which may, if desired, be utilized to conserve the heat of solution for use in, for example, heating coil **13** of column **10**. As will also be understood, it may be desired or convenient to dissolve gaseous ammonia exhausted through conduit **4** from the top of solution column **1** in water, for combining with the aqueous ammonia solution withdrawn from washing tower **21** at conduit **23**, for distillation or other recovery of ammonia from such solution for cooling and compressing, etc., for re-use in forming additional quantities of ammoniacal solution of acetylene in solution column **1**.

While the methods and forms of apparatus herein described constitute a preferred embodiment of the invention, it is to be understood that the invention is not limited to these precise methods or forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

We claim:

1. In a process of the character described for safely handling gaseous acetylene during the transportation thereof at super-atmospheric pressures and concentrations higher than those at which said gaseous acetylene normally becomes readily explosive upon compression, the steps which comprise dissolving gaseous acetylene in substantially anhydrous liquid ammonia, subjecting said ammoniacal solution of acetylene to super-atmospheric pressure, withdrawing from said solution a vapor phase admixture consisting essentially of gaseous acetylene and gaseous ammonia under super-atmospheric pressure, the concentration of said acetylene in said ammonia admixture being substantially higher than that which is stable against explosion if compressed to said pressure in the gaseous phase, transporting said gaseous acetylene and ammonia admixture at said super-atmospheric pressure, and separating said acetylene from said admixture after said transportation thereof.

2. In a process of the character described for safely handling gaseous acetylene during the transportation thereof at super-atmospheric pressure and concentrations higher than those at which said gaseous acetylene normally becomes readily explosive upon compression, the steps which comprise dissolving gaseous acetylene in substantially anhydrous liquid ammonia, subjecting said ammoniacal solution of acetylene to super-atmospheric pressure, heating said ammoniacal solution of acetylene, withdrawing from said solution a vapor phase admixture consisting essentially of gaseous acetylene and gaseous ammonia under super-atmospheric pressure, the concentration of said acetylene in said ammonia admixture being at least 25% by weight and substantially higher than that which is stable against explosion if compressed to said pressure in the gaseous phase, transporting said gaseous acetylene and ammonia admixture at said super-atmospheric pressure, and separating said acetylene from said admixture after said transportation thereof.

3. In a process of the character described for safely handling gaseous acetylene during the transportation thereof at super-atmospheric pressures and concentrations higher than those at which said gaseous acetylene normally becomes readily explosive upon compression, the steps which comprise dissolving gaseous acetylene in substantially anhydrous liquid ammonia forming an ammoniacal solution with an acetylene concentration of at least 10% by weight, subjecting said ammoniacal solution of acetylene to super atmospheric pressure, withdrawing from said solution a vapor phase admixture consisting essentially of gaseous acetylene and gaseous ammonia under super-atmospheric pressure, the concentration of said acetylene in said ammonia admixture being substantially higher than that which is stable against explosion if compressed to said pressure in the gaseous phase, transporting said gaseous acetylene and ammonia admixture at said super-atmospheric pressure, and separating said acetylene from said admixture after said transportation thereof.

4. In a process of the character described for safely handling gaseous acetylene during the transportation thereof at super-atmospheric pressures and concentrations higher than those at which said gaseous acetylene normally becomes readily expolsive upon compression, the steps which comprise dissolving gaseous acetylene in substantially anhydrous liquid ammonia, subjecting said ammoniacal solution of acetylene to super-atmospheric pressure, withdrawing from said solution a vapor phase admixture consisting essentially of gaseous acetylene and

gaseous ammonia under super-atmospheric pressure up to about 50 atmospheres, the concentration of said acetylene in said ammonia admixture being substantially higher than that which is stable against explosion if compressed to said pressure in the gaseous phase, transporting said gaseous acetylene and ammonia admixture at said super-atmospheric pressure, separating said acetylene from said admixture after said transportation thereof, and recovering said ammonia from said separating steps for recycling into said dissolving step with a subsequent quantity of gaseous acetylene.

5. In a process of the character described for safely handling gaseous acetylene during the transportation thereof at super-atmospheric pressures and concentrations higher than those at which said gaseous acetylene normally becomes readily explosive upon compression, the steps which comprise forming a gaseous admixture consisting essentially of acetylene gas and substantially anhydrous gaseous ammonia under super-atmospheric pressure for the pressurized transportation thereof, the concentration of said acetylene gas in said ammonia admixture being substantially higher than that which is stable against explosion if compressed to said pressure in the gaseous phase, transporting said gaseous acetylene and ammonia admixture at said super-atmospheric pressure, and separating said acetylene gas from said admixture after said transportation thereof.

6. The process as recited in claim 5 in which the concentration of said acetylene gas in said gaseous ammonia admixture is at least 20% by weight effecting stabilizing of said acetylene gas with said gaseous ammonia against explosion at any of a variety of super-atmospheric pressures up to about 50 atmospheres, and in which the maximum concentration of said acetylene in said gaseous ammonia admixture is increasingly more than 20% at super-atmospheric pressures increasingly less than 50 atmospheres.

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