[0005] Despite improved thermal stability in such cylinder systems, the Applicants have discovered that specific modifications to the existing acetylene cylinder fluid supply packages results in improved storage., handling and delivery capabilities, as will now be explained.

Summary of the Invention

[0006] In one aspect, a composition comprising a solution of an improved solvent in combination with acetylene dissolved within the improved solvent, said improved solvent characterized by all of the following attributes: (i) a vapor pressure at 20 deg C of approximately 6 torr or less; (ii) a Hansen solubility factor (**dH)** greater than about 5 $MPa^{0.5}$; (iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and (iv) a chemical structure comprising at least one of O,N or F atoms, wherein the at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus, boron, calcium and nickel.

[0007] In a second aspect, an acetylene fluid supply package, comprising a pressure vessel; a porous filler in the pressure vessel; an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent; said improved solvent comprising all of the following attributes: (i) a vapor pressure at 20 deg of approximately 6 torr or less; (ii) a Hansen solubility factor (**dH)** greater than about 5 $MPa^{0.5}$; (iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and (iv) a chemical structure comprising O,N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus boron, calcium and nickel.

[0007a] In yet another aspect, there is provided an acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent;

said improved solvent comprising all of the following attributes:

(i) a vapor pressure at 20 deg of 6 torr or less;

(ii) a Hansen solubility factor (**dH)** greater than 5 $MPa^{0.5}$;

(iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and

(iv) a chemical structure comprising O,N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus boron, calcium and nickel;

wherein the improved solvent is mesityl oxide, said mesityl oxide loaded into the pressure vessel in an amount no greater than 0.54 kg of mesityl oxide per liter of volume of the pressure vessel.

[0008] In a third aspect, a system comprising at least one acetylene fluid supply package and an acetylene-utilizing process tool in fluid communication with the at least one acetylene fluid supply package, said at least one acetylene fluid supply package, comprising a pressure vessel; a porous filler in the pressure vessel; an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the

improved solvent; said improved solvent comprising all of the following attributes: (i) a vapor pressure at 20 deg of approximately 6 torr or less; (ii) a Hansen solubility factor (**dH)** greater than about 5 $MPa^{0.5}$; (iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and (iv) a chemical structure comprising O, N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus, boron, calcium and nickel; wherein the at least one acetylene fluid supply package is configured to allow a discharge of the acetylene fluid under dispensing conditions; and further wherein said acetylene-utilizing process tool is configured to receive the acetylene fluid from the at least one acetylene fluid supply package.

[0008a] In yet another aspect, the present disclosure provides a system comprising at least one acetylene fluid supply package and an acetylene-utilizing process tool in fluid communication with the at least one acetylene fluid supply package, said at least one acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent;

said improved solvent comprising all of the following attributes:

(i) a vapor pressure at 20 deg of 6 torr or less;

(ii) a Hansen solubility factor (**dH)** greater than 5 $MPa^{0.5}$;

(iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and

(iv) a chemical structure comprising O, N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus, boron, calcium and nickel;

wherein the at least one acetylene fluid supply package is configured to allow a discharge of the acetylene fluid under dispensing conditions; and

further wherein said acetylene-utilizing process tool is configured to receive the acetylene fluid from the at least one acetylene fluid supply package; and

further wherein the improves solvent is mesityl oxide loaded into the pressure vessel in an amount no greater than 0.54 kg of mesityl oxide per liter of volume of the pressure vessel, or the improved solvent is pentoxone loaded in the pressure vessel in an amount no greater than 0.55 kg of pentoxone per liter of volume of the pressure vessel.

[0008b] In yet another aspect, there is provided an acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent;

said improved solvent comprising all of the following attributes:

(i) a vapor pressure at 20 deg of 6 torr or less;

(ii) a Hansen solubility factor (**dH)** greater than 5 $MPa^{0.5}$;

(iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and

(iv) a chemical structure comprising O,N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus boron, calcium and nickel;

wherein the improved solvent is pentoxone, said pentoxone loaded in the pressure vessel in an amount no greater than about 0.55 kg of pentoxone per liter of volume of the pressure vessel.

Brief Description of the Drawings

[0009] **Figure 1** is a representative schematic of an acetylene fluid supply package with an improved solvent in combination with an acetylene fluid at least partially solubilized within the improved solvent;

[0010] **Figure 2** is a representative schematic of Figure 1 with a solvent trap device;

[0011] **Figure 3** is a variation of Figure 2, whereby the solvent trap device is located in a different position; and

[0012] **Figure 4** represents a process diagram that shows a representative method of using the acetylene fluid supply package with a downstream process tool.

Detailed Description of the Invention

[0013] The compositions, fluid supply packages and systems disclosed herein may comprise, consist, or consist essentially of any of the specific components and structures illustratively described herein. The disclosure further contemplates restrictively defined compositions, fluid supply packages, and systems, e.g., wherein one or more of the specifically described parts, components, and structures may be specifically omitted, in defining operative embodiments of the present disclosure.

Claims

1. An acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent;

said improved solvent comprising all of the following attributes:

(i) a vapor pressure at 20 deg of 6 torr or less;

(ii) a Hansen solubility factor (**dH)** greater than 5 $MPa^{0.5}$;

(iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and

(iv) a chemical structure comprising O,N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus boron, calcium and nickel;

wherein the improved solvent is mesityl oxide, said mesityl oxide loaded into the pressure vessel in an amount no greater than 0.54 kg of mesityl oxide per liter of volume of the pressure vessel.

2. The acetylene fluid supply package of claim 1, wherein the improved solvent is mesityl oxide, said mesityl oxide loaded into the pressure vessel in an amount no greater than 0.51 kg of mesityl oxide per liter of volume the pressure vessel.

3. The acetylene fluid supply package of claim 1, wherein the improved solvent is mesityl oxide loaded into the pressure vessel in an amount no greater than 0.49 kg of mesityl oxide per liter of volume of the pressure vessel.

4. A system comprising at least one acetylene fluid supply package and an acetylene-utilizing process tool in fluid communication with the at least one acetylene fluid supply package, said at least one acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent;

said improved solvent comprising all of the following attributes:

(i) a vapor pressure at 20 deg of 6 torr or less;

(ii) a Hansen solubility factor (**dH)** greater than 5 $MPa^{0.5}$;

(iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and

(iv) a chemical structure comprising O, N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus, boron, calcium and nickel;

wherein the at least one acetylene fluid supply package is configured to allow a discharge of the acetylene fluid under dispensing conditions; and

further wherein said acetylene-utilizing process tool is configured to receive the acetylene fluid from the at least one acetylene fluid supply package; and

further wherein the improves solvent is mesityl oxide loaded into the pressure vessel in an amount no greater than 0.54 kg of mesityl oxide per liter of volume of the pressure vessel, or the improved solvent is pentoxone loaded in the pressure vessel in an amount no greater than 0.55 kg of pentoxone per liter of volume of the pressure vessel.

5. An acetylene fluid supply package, comprising

a pressure vessel;

a porous filler in the pressure vessel;

an improved solvent within the porous filler, said solvent solubilizing with acetylene absorbed within the improved solvent;

said improved solvent comprising all of the following attributes:

(i) a vapor pressure at 20 deg of 6 torr or less;

(ii) a Hansen solubility factor (**dH)** greater than 5 $MPa^{0.5}$;

(iii) higher non-toxicity in comparison to dimethylformamide (DMF) and N-methylpyrrolidone (NMP); and

(iv) a chemical structure comprising O,N or F atoms, wherein at least one of said O, N or F atoms is not bonded to a hydrogen atom, and further wherein said chemical structure is characterized by an absence of phosphorus boron, calcium and nickel;

wherein the improved solvent is pentoxone, said pentoxone loaded in the pressure vessel in an amount no greater than about 0.55 kg of pentoxone per liter of volume of the pressure vessel.

6. The acetylene fluid supply package of claim 5, wherein the improved solvent is pentoxone, said pentoxone loaded into the pressure vessel in an amount no greater than 0.53 kg of pentoxone per liter of volume of the pressure vessel.

7. The acetylene fluid supply package of claim 5, wherein the improved solvent is pentoxone, said pentoxone loaded into the pressure vessel in an amount no greater than 0.50 kg of pentoxone per liter of volume of the pressure vessel.