

Claims

1. 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.
2. The composition of claim 1, wherein the improved solvent is mixed with an additional solvent.
3. The composition of claim 1, further comprising a porous filler.
4. The composition of claim 1, wherein the improved solvent is selected from the group consisting of mesityl oxide, dihydrolevoglucosenone, tetraethylene glycol dimethyl ether, acetic anhydride, acetyl pyrrolidone; cyclohexanone and pentoxone.
5. The composition of claim 3, wherein the higher non-toxicity is characterized by an absence of a H360 hazard statement code.
6. 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.

7. The acetylene fluid supply package of claim 6, wherein the improved solvent is selected from the group consisting of mesityl oxide, dihydrolevoglucosenone, tetraethylene glycol dimethyl ether, acetic anhydride, cyclohexanone, acetyl pyrrolidone; and pentoxone.

8. The acetylene fluid supply package of claim 6, further comprising the acetylene in a stabilized state at a pressure of up to 300 psig at ambient conditions.

9. The acetylene fluid supply package-of claim 6, wherein said improved solvent is characterized by an absence of a H360 hazard statement code.

10 The acetylene fluid supply package of claim 6, wherein the improved solvent is mesityl oxide, said mesityl oxide loaded into the pressure vessel in an amount no greater than about 0.54 kg of mesityl oxide per liter of volume of the pressure vessel.

11. The acetylene fluid supply package of claim 6, wherein the improved solvent is mesityl oxide, said mesityl oxide loaded into the pressure vessel in an amount no greater than about 0.51 kg of mesityl oxide per liter of volume the pressure vessel.

12. The acetylene fluid supply package of claim 6, wherein the improved solvent is mesityl oxide loaded into the pressure vessel in an amount no greater than about 0.49 kg of mesityl oxide per liter of volume of the pressure vessel.
13. The acetylene fluid supply package of claim 6, wherein the improved solvent is pentoxone, said pentoxone loaded into the pressure vessel in an amount no greater than about 0.55 kg of pentoxone per liter of volume of the pressure vessel.
14. The acetylene fluid supply package of claim 6, wherein the improved solvent is pentoxone, said pentoxone loaded into the pressure vessel in an amount no greater than about 0.53 kg of pentoxone per liter of volume of the pressure vessel.
15. The acetylene fluid supply package of claim 6, wherein the improved solvent is pentoxone, said pentoxone loaded into the pressure vessel in an amount no greater than about 0.50 kg of pentoxone per liter of volume of the pressure vessel.
16. 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.

17. The system of claim 16, wherein the process tool comprises a chemical vapor deposition tool.

18. The system of claim 16, wherein the at least one at least one acetylene fluid supply package is contained in a gas box.

19. The system of claim 16, wherein the higher non-toxicity is characterized an absence of a H360 hazard statement code.

20. The system of claim 16, wherein the vapor pressure is 9 torr or less.

21. The acetylene fluid supply package of claim 16, wherein the improved solvent is mesityl oxide, said mesityl oxide loaded into the pressure vessel in an amount no greater than about 0.54 kg of mesityl oxide per liter of volume of the pressure vessel.

22. The acetylene fluid supply package of claim 16, wherein the improved solvent is pentoxone, said pentoxone loaded into the pressure vessel in an amount no greater than about 0.55 kg of pentoxone per liter of volume of the pressure vessel.