CLAIMS

What is claimed is:

1. A process comprising subjecting a product mixture comprising at least one of E-1,2-difluoroethylene (HFO-E-1132) and Z-1,2-difluoroethylene (HFO-Z-1132), and first amounts of acetylene and fluoroethylene (HFO-1141) to fractional distillation, withdrawing an E-1,2-difluoroethylene fraction containing at least second amounts of acetylene and fluoroethylene (HFO-1141) less than said first amounts.

2. A process comprising subjecting a product mixture comprising at least one of E-1,2-difluoroethylene (HFO-E-1132) and Z-1,2-difluoroethylene (HFO-Z-1132), and first amounts of acetylene and fluoroethylene (HFO-1141) to fractional distillation, withdrawing an E-1,2-difluoroethylene fraction and scrubbing the fraction to provide a first scrubbed fraction containing second amounts of acetylene and fluoroethylene (HFO-1141) which are at least 30% lower than the first amounts.

3. The process of claim 1 or claim 2, wherein the second amounts are at least 50% lower than the first amounts of acetylene and fluoroethylene (HFO-1141).

4. The process of claim 2, wherein the scrubbing comprises one of (i) contacting the product mixture with hydrogen halides selected from one of hydrofluoric acid, hydrochloric acid, hydrobromic acid and hydroiodic acid; (ii) contacting the product mixture with one of sulfuric acid or sodium hypochlorite; (iii) contacting the product mixture with one of a silica gel, a silica gel impregnated with sulfuric acid, or a silica gel impregnated with protic acid; or (iv) contacting the product mixture with one of acetone, methanol, ethanol, N,N-dimethylformamide, and N-methyl-pyrrolidinone.

5. A process comprising,

   a) contacting one of (i) 1,2-dichloro-1,2-difluoroethane (HFC-132) and (ii) 1,1,1,2-tetrafluoroethane in the liquid phase, a dehydrohalogenating agent, and a solvent,

b) producing a product mixture comprising at least one of E-1,2-difluoroethylene (HFO-E-1132) and Z-1,2-difluoroethylene (HFO-Z-1132), and one or more compounds selected from (a) acetylene, (b) fluoroacetylene, (c) difluoromethane (HFC-32), (d) 1,1,1,2,2-pentafluoroethane (HFC-125),(e) E-1-chloro-1,2-difluoroethylene (HCFO-E-1122a), (f) Z-1-chloro-1,2-difluoroethylene (HCFO-Z-1122a), (g) 1,1,2-trifluoroethylene (HFO-1123), (h) fluoroethylene (HFO-1141), (i) 1-chloro-1,2,2-trifluoroethane (HCFC-133), (j) 1-chloro-1,1,2-trifluoroethane (HCFC-133b), (k) 1,1-dichloro-2,2,2-trifluoroethane (HCFC-123), (l) 1,2-difluoroethane (HFC-152), (m) 1,1,2-trifluoroethane (HFC-143), (n) fluoromethane (HFC-41), (o) chlorodifluoromethane (HCFC-22), (p) 1-chloro-1,2-difluoroethane(HCFC-142a), (q) 1,1-difluoroethylene (HFO-1132a), (r) vinyl chloride (HCO-1140), (s) 1-chloro-1-fluoroethene (HCFO-1131a), (t) E-1-chloro-2-fluoroethene (HCFO-E-1131), (u) Z-1-chloro-1-fluoroethene (HCFO-Z-1131), and (v) 1-chloro-2,2-difluoroethylene (HCFO-1122), and wherein acetylene and fluoroacetylene are present at a first level, and

c) treating the product mixture to reduce the amount of acetylene and fluoroacetylene to a level less than the first level wherein the amount of acetylene and fluoroacetylene are respectively one of <100ppm, <50 ppm, <25ppm, <10ppm or <1 ppm.

6. The process of claim 5, wherein the treating comprises distilling the product mixture and forming a 1,2-difluoroethylene fraction, and scrubbing the 1,2-difluoroethylene fraction.

7. The process of claim 6, wherein the scrubbing comprises one of (i) contacting the product mixture with hydrogen halides selected from one of hydrofluoric acid, hydrochloric acid, hydrobromic acid and hydroiodic acid; (ii) a material selected from the group consisting of sulfuric acid and sodium hypochlorite; (iii) a material selected from the group consisting of a silica gel, a silica gel impregnated with sulfuric acid, and a silica gel impregnated with protic acid; or (iv) a material selected from the group consisting of acetone, methanol, ethanol, N,N-dimethylformamide, and N-methyl-pyrrolidinone.

8. The process of claim 2 or claim 6, wherein the treating comprises passing the fraction through a bed of silica gel.

9. The process of claim 2 or claim 6, wherein the treating comprises one of (i) passing the fraction through a bed of silica gel, (ii) contacting the fraction with sulfuric acid, or (iii) contacting the fraction with N-methyl-pyrrolidinone.

10. The process of claim 8, wherein the treating reduces at least one of the acetylene and fluoroethylene (HFO-1141) to an amount <10 ppm or substantially free of at least one of the acetylene and fluoroethylene (HFO-1141).

11. The process of claim 9, wherein the treating reduces at least one of the acetylene and fluoroethylene (HFO-1141) to an amount of <10 ppm or substantially free of at least one of the acetylene and fluoroethylene (HFO-1141).

12. A process comprising subjecting a product mixture comprising at least one of E-1,2-difluoroethylene (HFO-E-1132) and Z-1,2-difluoroethylene (HFO-Z-1132), and first amounts of at least one of acetylene and fluoroethylene (HFO-1141) to fractional distillation.

13. The process of claim 12 further comprising distilling at least one of (i) a mixture comprising at least one of E-1,2-difluoroethylene and Z-1,2-difluoroethylene and second, lower amounts of at least one of acetylene and fluoroethylene, or (ii) a fraction rich in at least one of acetylene and fluoroethylene.

14. The process of claim 12 comprising distilling and withdrawing a fraction rich in at least one of acetylene and fluoroethylene, wherein the acetylene and/or fluoroethylene rich fraction is optionally selected from one substantially free of HFO-E-1132 or completely free of HFO-E-1132.

15. The process of claim 12 comprising distilling and withdrawing a E-1,2-difluoroethylene and Z-1,2-difluoroethylene rich fraction and an acetylene and fluoroethylene rich fraction, wherein the acetylene and/or fluoroethylene rich fraction is optionally selected from one substantially free of HFO-E-1132 or completely free of HFO-E-1132.

16. A process comprising:

a) providing a product mixture comprising E-1,2-difluoroethylene (HFO-E-1132) or Z-1,2-difluoroethylene (HFO-Z-1132) or a mixture of E-1,2-difluoroethylene, Z-1,2-difluoroethylene, at least acetylene, fluoroacetylene, and optionally one or more additional compounds selected from HFO-1141, HCFO-E-1131, HCFO-E-1122a, HCFO-Z-1122a, HCFO-1131a, HCFO-Z-1131, HCO-1140, HFC-134, and HCFO-1122, wherein the at least acetylene and fluoroacetylene are at a first level,

b) subject the mixture to fraction distillation to produce a first fraction,

c) scrubbing the first fraction wherein each of the amounts of acetylene and fluoroethylene (HFO-1141) is present in an amount that is one of at least 50% lower, at least 60% lower, at least 70% lower than said first level,

wherein the scrubbing is selected from one of:

d) treatment with hydrogen halides selected from one of hydrofluoric acid, hydrochloric acid, hydrobromic acid and hydroiodic acid,

e) treatment with one of sulfuric acid or sodium hypochlorite,

f) treatment with a silica gel, or silica gel impregnated with sulfuric acid or protic acid, or

g) treatment with a solvent selected from one of acetone, methanol, ethanol, N,N-dimethylformamide, and N-methyl-pyrrolidinone.

17. The process of any one of claims 1 to 11 wherein the total amount of acetylene, fluoroacetylene, vinyl chloride (HCO-1140), and/or fluoroethylene (HFO-1141) is reduced to a level of one of <1000 ppm, <500 ppm, <400 ppm, <300 ppm, <200 ppm, <100 ppm, <50 ppm, <10 ppm, <5 ppm, <1 ppm, or substantially free of any one of acetylene, fluoroacetylene, vinyl chloride (HCO-1140), and/or fluoroethylene (HFO-1141) containing <0.9 ppm including 0 ppm.