CLAIMS

What is claimed is:

1. A method comprising converting 1-chloro-1,1-difluoropropane (HCFC-262fc) to 1,1-difluoropropene (HFO-1252zc).

2. The method of claim 1, further comprising contacting 1,3-dicloro-1,1-difluoropropane (HCFC-252fc) and hydrogen to form the HCFC-262fc.

3. The method of claim 2, further comprising contacting 1,1,1,3-tetrachloropropane (HCC-250fb) and hydrogen fluoride in a liquid phase reaction to form the HCFC-252fc.

4. The method of claim 1, further comprising contacting 3-chloro-3,3-difluoro-1-propene (HCFO-1242zf) and hydrogen to form the HCFC-262fc.

5. The method of claim 4, further comprising:

   contacting 1,1,1,3-tetrachloropropane (HCC-250fb) and hydrogen fluoride in a vapor phase reaction to form the HCFO-1242zf, or

   contacting 1,3-dicloro-1,1-difluoropropane (HCFC-252fc) with a caustic agent in an aqueous solvent to form the HCFO-1242zf.

6. The method of claim 4, further comprising the steps of:

   (i) contacting 1,1,1,3-tetrachloropropane (HCC-250fb) and hydrogen fluoride in a liquid phase reaction to form 1,3-dicloro-1,1-difluoropropane (HCFC-252fc); and

   (ii) contacting the HCFC-252fc with a caustic agent in an aqueous solvent to form the HCFO-1242zf.

7. A method comprising the steps of:

   (ia) contacting 1,1,1,3-tetrachloropropane (HCC-250fb) and hydrogen fluoride in a vapor phase reaction to form 3-chloro-3,3-difluoro-1-propene (HCFO-1242zf), or

   (ib) contacting 1,3-dicloro-1,1-difluoropropane (HCFC-252fc) with a caustic agent in an aqueous solvent to form 3-chloro-3,3-difluoro-1-propene (HCFO-1242zf); and

(ii) contacting the HCFO-1242zf with zinc to form 1,1-difluoropropene (HFO-1252zc).

8. The method of claim 7, further comprising a step of contacting 1,1,1,3-tetrachloropropane (HCC-250fb) and hydrogen fluoride in a liquid phase reaction to form the HCFC-252fc prior to step (ib).

9. The method of claim 2, wherein the contacting of the HCFC-252fc and hydrogen to form HCFC-262fc occurs in the vapor phase or in the liquid phase.

10. The method of claim 4, wherein the contacting of the HCFO-1242zf and hydrogen to form HCFC-262fc occurs in the vapor phase or in the liquid phase.

11. The method of claim 9 or claim 10, wherein the liquid phase contacting is in the presence of a catalyst selected from the group consisting of a group VIII metal, Pd, Pt, Ni, Cu, and combination of two or more thereof, preferably Pd.

12. The method of claim 11, wherein the catalyst is unsupported or is supported.

13. The method of claim 12, wherein the support is a carbon or aluminum oxide support.

14. The method of any one of claims 1 to 6, wherein the conversion of HCFC-262fc to HFO-1252zc comprises dehydrohalogenation of the HCFC-262fc.

15. The method of claim 14, wherein the conversion of HCFC-262fc to HFO-1252zc by dehydrohalogenation of the HCFC-262fc occurs in the vapor phase or in the liquid phase using a strong base.

16. The method of claim 5 or claim 7, wherein the contacting HCC-250fb with hydrogen fluoride to form HCFO-1242zf is in the absence of a catalyst.

17. The method of claim 5 or claim 7, wherein contacting HCC-250fb with hydrogen fluoride is in the presence of a catalyst selected from the group consisting of Lewis acid catalysts, transition metal halides, transition metal oxides (preferably partially fluorinated transition metal oxides), Group IVb metal halides, Group Vb metal halides, and metal alloy packing having catalytic activity.

18. The method of any one of claims 5 to 7, wherein the caustic agent is selected from the group consisting of alkali metal oxides, hydroxides, amides, alkaline

earth metal hydroxides, alkaline earth metal oxides or amides, alkali metal carbonates, alkali metal phosphate and alkali metal carboxylate.

19. The method of any one of claims 5 to 7 and 18, wherein the HCFC-252fc is contacted with the caustic agent at a temperature in the range of about 20°C to about 150°C, preferably about 30°C to about 100°C.

20. The method of any one of claims 1 to 6, wherein converting the HCFC-262fc to HFO-1252zc comprises contacting the HCFC-262fc with a strong base in a solvent.

21. The method of claim 20, wherein the strong base is selected from the group consisting of hydroxides, alkoxides, metal amides, metal hydrides, metal dialkylamides and arylamines.

22. The method of claim 20 or claim 21, wherein the strong base is selected from the group consisting of alkoxides including lithium, sodium and potassium salts of methyl, ethyl and t-butyl oxides; metal amides including sodium amide, potassium amide and lithium amide; metal hydrides including sodium hydride, potassium hydride and lithium hydride; and metal dialkylamides including lithium, sodium, and potassium salts of methyl, ethyl, n-propyl, iso-propyl, n-butyl, tert-butyl, trimethylsilyl and cyclohexyl substituted amides.

23. The method of claim 5 or claim 7, wherein the HCC-250fb is contacted with hydrogen fluoride in the vapor phase in the presence of a catalyst to co-produce 3,3,3-trifluoropropene (HFO-1243zf, $CF_3CH{=}CH_2$) and the HCFO-1242zf.

24. The method of claim 23, wherein the catalyst is a metal surface.

25. The method of claim 24, wherein the metal surface is the surface of a metal alloy packing.

26. The method of any one of claims 23 to 25, wherein the catalyst is selected from the group consisting of Lewis acid catalysts, transition metal halides, transition metal oxides (preferably partially fluorinated transition metal oxides), Group IVb metal halides, Group Vb metal halides, chromium-based catalyst, cobalt-based catalyst, nickel-based catalyst, aluminum-based catalyst, iron-based catalyst, and combinations thereof.

27. A composition comprising, consisting essentially of, or consisting of HFO-1252zc and one or more additional compounds selected from the group consisting of HCC-250fb, HCFC-252fc, HCFC-262fc and HCFO-1242zf.

28. A composition comprising, consisting essentially of, or consisting of HFO-1252zc and one or more additional compounds selected from the group consisting of HCFC-262fc, HCC-250fb, HFC-263fb, HFO-1243zf, other 1252 isomers, ethane, ethylene, HFC-23, HCFC-22, HFO-1132a, propane, HFC-143a, HCFC-142b, HFO-1234yf, HFO-1234ze, HFO-1225zc, HCFO-1242zf, and HCFC-252fc.

29. A composition comprising, consisting essentially of, or consisting of (i) HFO-1252zc; (ii) at least one of HCC-250fb, HCFC-252fc and HCFC-262fc; and (iii) one or more additional compounds selected from the group consisting of HFC-263fb, HFO-1243zf, other 1252 isomers, ethane, ethylene, HFC-23, HCFC-22, HFO-1132a, propane, HFC-143a, HCFC-142b, HFO-1234yf, HFO-1234ze, HFO-1225zc, and HCFO-1242zf.

30. A composition comprising, consisting essentially of, or consisting of HFO-1252zc, HCFC-262fc, and one or more additional compounds selected from the group consisting of HCC-250fb, HFC-263fb, HFO-1243zf, other 1252 isomers, ethane, ethylene, HFC-23, HCFC-22, HFO-1132a, propane, HFC-143a, HCFC-142b, HFO-1234yf, HFO-1234ze, HFO-1225zc, HCFO-1242zf and HCFC-252fc.

31. A composition comprising, consisting essentially of, or consisting of HFO-1252zc, HCFC-262fc, HCFC-252fc, and one or more additional compounds selected from HCC-250fb, HFC-263fb, HFO-1243zf, other 1252 isomers, ethane, ethylene, HFC-23, HCFC-22, HFO-1132a, propane, HFC-143a, HCFC-142b, HFO-1234yf, HFO-1234ze, HFO-1225zc and HCFO-1242zf.

32. A composition comprising, consisting essentially of, or consisting of HFO-1252zc and one or more additional compounds selected from the group consisting of HCFC-262fc, HCC-250fb, HFC-263fb, HCFO-1242zf, HFO-1252zf, HFO-1243zf and HCFC-252fc.

33. A composition comprising, consisting essentially of, or consisting of (i) HFO-1252zc; (ii) at least one of HCC-250fb and HCFO-1242zf; and (iii) one or more additional compounds selected from HCFC-262fc, HFC-263fb, HFO-1252zf, HFO-1243zf and HCFC-252fc.

34. A composition comprising, consisting essentially of, or consisting of HFO-1252zc and one or more additional compounds selected from the group consisting of HFC-263fb, HCFC-262fc, E-HFO-1251zb, Z-HFO-1251zb, HCFC-272fb, methane, HFC-32, ethylene, ethane, HFO-1132a, HCC-40, HCFC-22, ethylene oxide, E-HFO-1261ze, HFO-1252 isomers, HFC-281fa, HCC-30, $C_4H_3ClF_4$, $C_4H_6F_4$ (I), $C_4H_6F_4$ (II), C_6F_{12}, HFO-1252zc dimer (I) and HFO-1252zc dimer (II).

35. A composition comprising, consisting essentially of, or consisting of HFO-1252zc and one or more additional compounds selected from the group consisting of HFC-263fb, HCFC-262fc, E-HFO-1251zb, Z-HFO-1251zb, HCFC-272fb, methane, HFC-32, ethylene, ethane, HFO-1132a, HCC-40, HCFC-22, E-HFO-1261ze, HFO-1252 isomers, HFC-281fa, HCC-30, $C_4H_3ClF_4$, $C_4H_6F_4$ (I), $C_4H_6F_4$ (II), C_6F_{12}, HFO-1252zc dimer (I) and HFO-1252zc dimer (II).

36. A composition comprising, consisting essentially of, or consisting of HFO-1252zc and one or more additional compounds selected from the group consisting of HFC-263fb, HCFC-262fc, E-HFO-1251zb, Z-HFO-1251zb, HCFC-272fb, HFO-1252zc dimer (I) and HFO-1252zc dimer (II).