CLAIMS

What is claimed is:

1. A composition comprising HFO-1234ze(E), HFC-152a, and at least one compound selected from the group consisting of HFC-227ea, HFO-1336mzz(E), HFC-134, HFC-125, HFC-32, HFC-134a, HCFO-1224yd(Z), CO2, and combinations thereof.

2. The composition of claim 1, wherein said composition comprises one of:

   a. HFO-1234ze(E), HFC-152a, and HFC-227ea;

   b. HFO-1234ze(E), HFC-152a, and HFO-1336mzz(E);

   c. HFO-1234ze(E), HFC-152a, HFO-1336mzz(E), and HFC-227ea;

   d. HFO-1234ze(E), HFC-134, and HFC-152a;

   e. HFO-1234ze(E), HFC-125, and HFC-152a;

   f. HFO-1234ze(E), HFC-32, and HFC-152a;

   g. HFO-1234ze(E), HFC-152a and CO_2;

   h. HFO-1234ze(E), HFC-125, HFC-32, and HFC-152a; or

   i. HFO-1234ze(E), HFC-134a, HCFO-1224yd(Z), and HFC-152a.

3. The composition of claim 1 or 2, wherein said composition comprises one of:

   a. from about 88 to 91 weight percent HFO-1234ze(E), from about 4 to 9 weight percent HFC-227ea, and from about 3 to 5 weight percent HFC-152a;

   b. from about 70 to 80 weight percent HFO-1234ze(E), from about 5 to 20 weight percent HFO-1336mzz(E), from about 5 to 25 weight percent HFC-152a, and from about 1 to 3 weight percent HFC-227ea;

   c. from about 75 to 85 weight percent HFO-1234ze(E), from about 2 to 8 weight percent HFC-134, and from about 10 to 20 weight percent HFC-152a;

   d. from about 75 to 85 weight percent HFO-1234ze(E), from about 3 to 7 weight percent HFC-125, and from about 10 to 20 weight percent HFC-152a;

   e. from about 75 to 85 weight percent HFO-1234ze(E), from about 3 to 7 weight percent HFC-125, from about 3 to 7 weight percent HFC-32, and from about 5 to 15 weight percent HFC-152a;

f. from about 75 to 85 weight percent HFO-1234ze(E), from about 3 to 7 weight percent HFC-134a, from about 3 to 7 weight percent HCFO-1224yd(Z), and from about 5 to 15 weight percent HFC-152a; and

g. about 60 weight percent HFO-1234ze(E), about 10 weight percent HFC-32, and about 30 weight percent HFC-152a.

4. The composition of any one of claims 1 to 3, further comprising at least one additional compound selected from the group consisting of HFO-1234yf, HFC-245cb, HFO-1225ye(E), HFO-1225ye(Z), HFO-1225zc, HFC-236fa, HFC-152a, HFC-143a, HFC-125, HFC-134a, HFO-1234zc, HCFO-1233xf, HCFO-1233zd, CFC-114, HCFC-124, HFO-2223, HFO-1234ze(Z), HFC-245fa, HFC-227ea, HFO-1243zf, and HFC-263fb.

5. The composition of any one of claims 1 to 4, further comprising (i) one or more additional compounds selected from the group consisting of HFO-1234yf, HFC-245cb, HFO-1225ye(E), HFO-1225ye(Z), HFO-1225zc, HFC-236fa, HFC-143a, HFC-125, HFC-134a, HFO-1234zc, HFO-1233xf, HFO-1233zd, CFC-114, HCFC-124, trifluoropropyne, HFO-1234ze(Z), HFC-245fa, HFC-227ea, HFO-1243zf, HFC-263fb, HFC-134, HFC-161, HCC-40, isobutane, HCO-1140, HCC-160 and CFC-114a, preferably two or more compounds or preferably three or more compounds; or (ii) one or more additional compounds selected from the group consisting of HFO-1234yf, HFC-245cb, HFC-134, HFC-134a, HFC-125, HFO-1225zc, HFO-1243zf, HFC-161, HCC-40, HCO-1140 and HCC-160, preferably two or more compounds or preferably three or more compounds.

6. A composition comprising HFO-1234ze(E), HFC-152a, and (i) one or more additional compounds selected from the group consisting of HFO-1234yf, HFC-245cb, HFO-1225ye(E), HFO-1225ye(Z), HFO-1225zc, HFC-236fa, HFC-143a, HFC-125, HFC-134a, HFO-1234zc, HFO-1233xf, HFO-1233zd, CFC-114, HCFC-124, trifluoropropyne, HFO-1234ze(Z), HFC-245fa, HFC-227ea, HFO-1243zf, HFC-263fb, HFC-134, HFC-161, HCC-40, isobutane, HCO-1140, HCC-160 and CFC-114a, preferably two or more compounds or preferably three or more compounds, or (ii) one or more additional compounds selected from the group consisting of HFO-1234yf, HFC-245cb, HFC-134, HFC-

134a, HFC-125, HFO-1225zc, HFO-1243zf, HFC-161, HCC-40, HCO-1140 and HCC-160, preferably two or more compounds or preferably three or more compounds.

7. The composition of claim 6, the composition comprising one of:
    a. HFO-1234ze(E), HFC-152a, HFC-245cb and HFC-161;
    b. HFO-1234ze(E), HFC-152a, HFO-1243zf and HFC-161;
    c. HFO-1234ze(E), HFC-152a, HFO-1243zf and HCO-1140;
    d. HFO-1234ze(E), HFC-152a, HFC-134 and HFC-134a;
    e. HFO-1234ze(E), HFC-152a, HFO-1234yf and HFC-161;
    f. HFO-1234ze(E), HFC-152a, HFO-1234yf and HCC-160;
    g. HFO-1234ze(E), HFC-152a, HFO-1225zc and HFC-161;
    h. HFO-1234ze(E), HFC-152a, HFC-134 and HFC-161;
    i. HFO-1234ze(E), HFC-152a, HFC-134a and HFO-1140;
    j. HFO-1234ze(E), HFC-152a, HCC-40 and HFC-161;
    k. HFO-1234ze(E), HFC-152a, HFO-1225zc and HCO-1140;
    l. HFO-1234ze(E), HFC-152a, HFO-1225zc and HFC-161;
    m. HFO-1234ze(E), HFC-152a, HFO-1225zc and HCC-160
    n. HFO-1234ze(E), HFC-152a, HFO-1225zc and HFO-1243zf;
    o. HFO-1234ze(E), HFC-152a, HFC-245cb and HFO-1234yf;
    p. HFO-1234ze(E), HFC-152a, HFO-1234yf and HFC-134a;
    q. HFO-1234ze(E), HFC-152a, HFO-1234yf and HFC-134;
    r. HFO-1234ze(E), HFC-152a, HFO-1234yf and HFO-1243zf;
    s. HFO-1234ze(E), HFC-152a, HFC-245cb and HFC-134a;
    t. HFO-1234ze(E), HFC-152a, HFC-245cb and HFC-134; or
    u. HFO-1234ze(E), HFC-152a, HFC-245cb and HFO-1243zf.

8. The composition of claim 6, the composition comprising one of:
    a. HFO-1234ze(E), HFC-152a, HFC-245cb, HFO-1234yf and HFC-161;
    b. HFO-1234ze(E), HFC-152a, HFC-245cb, HFO-1234yf and HCO-1140;

c. HFO-1234ze(E), HFC-152a, HFC-245cb, HFO-1234yf and HCC-160;

d. HFO-1234ze(E), HFC-152a, HFC-245cb, HFO-1234yf and HCC-40;

e. HFO-1234ze(E), HFC-152a, HFC-134, HFC-134a and HFO-1140;

f. HFO-1234ze(E), HFC-152a, HFO-134, HFC-134a and HFC-161;

g. HFO-1234ze(E), HFC-152a, HFC-134, HFC-134a and HCO-40;

h. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1243zf and HFC-161;

i. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1243zf and HCO-1140;

j. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1243zf and HCC-40;

k. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1243zf and HFO-1234yf;

l. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1234yf and HFC-134a;

m. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1234yf and HFC-134;

n. HFO-1234ze(E), HFC-152a, HFO-1243zf, HFC-245cb and HFO-1234yf;

o. HFO-1234ze(E), HFC-152a, HFO-1243zf, HFC-134 and HFC-134a;

p. HFO-1234ze(E), HFC-152a, HFO-1234yf, HFC-134 and HFC-134a;

q. HFO-1234ze(E), HFC-152a, HFO-1243zf, HFC-245cb and HFC-134a;

r. HFO-1234ze(E), HFC-152a, HFO-1243zf, HFC-245cb and HFC-134;

s. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1243zf, HFO-1234yf and HFC-245cb;

t. HFO-1234ze(E), HFC-152a, HFO-1234yf, HFC-245cb, HFC-134a and HFC-134; or

u. HFO-1234ze(E), HFC-152a, HFO-1225zc, HFO-1234yf, HFC-134a and HFC-134.

9. The composition of any one of claims 1 to 8, further comprising a hydrocarbon selected from the group consisting of propane, propylene, cyclopropane, isobutane, n-butane, isobutene, and combinations thereof.

10. A process for producing cooling comprising condensing the composition of any one of claims 1 to 9 and thereafter evaporating said composition in the vicinity of a body to be cooled.

11. A process for producing heating comprising evaporating the composition of any one of claims 1 to 9 and thereafter condensing said composition in the vicinity of a body to be heated.

12. A refrigeration, air conditioning, heat pump, or chiller apparatus containing the composition of any one of claims 1 to 9, preferably further comprising an evaporator, a compressor, a condenser, and an expansion device.

13. A method for replacing a first refrigerant in a refrigeration, air conditioning, heat pump, or chiller apparatus, the first refrigerant being selected from the group consisting of R-22, HFC-134a, propane, HFO-1234yf, R-407C, R-404A, R-410A, R-513A, R-454A, R-454B, R-454C, R-448A, R-449A, R-449B, R-449C, R-1234zeE, R-515B, R471A, R-476A, R-482A, R-452A, and R-452C, the method comprising providing the composition of any one of claims 1 to 9 to the refrigeration, air conditioning, heat pump, or chiller apparatus.

14. A composition comprising HFO-1234ze(E) and:

    a. at least one compound selected from the group consisting of HFC-23, HFC-32, HFC-125, HFC-143a, HFC-134, HFC-152a, HFO-1132a, HFO-1132(E), HFO-1132(Z), HFO-1234ze(Z), HCFO-1233zd(E), HCFO-1233zd(Z), HFC-245fa, HFO-1336mzz(E), HFO-1336mzz(Z), HCC-1130(E), HCC-1130(Z), CFO-1112(E), CFO-1112(Z), HFC-356mcf, HFC-356mff and combinations thereof; or

    b. at least one compound selected from the group consisting of HFO-1234yf, HFC-227ea, HFO-1225ye(E), HCFO-1224yd(Z), HFC-134a; and combinations thereof; and

    c. optionally at least one compound selected from the group consisting of propane, propylene, cyclopropane, isobutane, n-butane, and isobutene.

15. A blowing agent composition comprising the composition according to any one of claims 1 to 9, preferably according to any one of claims 6 to 9.

16. The blowing agent composition of claim 15, wherein a ratio of HFO-1234ze(E):HFC-152a is from about 40:60 to about 60:40, preferably about 50:50 ratio, more preferably about 45:55.

17. The composition of claim 14, the composition comprising HFO-1234ze(E) and HFO-1132(E).