about 1 weight percent to about 99 weight percent trans-HFC-1234ze and about 99 weight percent to about 1 weight percent HFC-227ea; and

about 1 weight percent to about 99 weight percent trans-HFC-1234ze and about 99 weight percent to about 1 weight percent CF_3I;

to said refrigeration, air-conditioning, or heat pump apparatus that uses, used or designed to use said high GWP refrigerant.

The present invention further relates to a method for early detection of a refrigerant leak in a refrigeration, air-conditioning or heat pump apparatus said method comprising using a non-azeotropic composition in said apparatus, and monitoring for a reduction in cooling performance.

In one aspect, there is provided a composition comprising a refrigerant consisting of 40 to 99 weight percent HFC-1234yf and 60 to 1 weight percent HFC-32.

In another aspect, there is provided a method of replacing a high GWP refrigerant in a refrigeration, air conditioning, or heat pump apparatus, wherein said high GWP refrigerant is selected from the group consisting of R134a, R22, R123, R11, R245fa, R114, R236fa, R124, R12, R410A, R407C, R417A, R422A, R507A, R502, and R404A, the method comprising providing the composition described herein to the refrigeration, air-conditioning, or heat pump apparatus that uses, used or is designed to use the high GWP refrigerant.

In yet another aspect, there is provided a refrigeration, air-conditioning, or heat pump apparatus containing the composition described herein.

In a further aspect, there is provided a method of producing heat, the method comprising: condensing the composition described herein in the vicinity of a body to be heated and thereafter evaporating the composition.

In yet another aspect, there is provided a method of producing cooling, the method comprising: evaporating the composition described herein in the vicinity of a body to be cooled and thereafter condensing the composition.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to compositions comprising at least one fluoroolefin. The compositions of the present invention further comprise at least one additional component that may be a second fluoroolefin, hydrofluorocarbon (HFC), hydrocarbon, dimethyl ether, bis(trifluoromethyl)sulfide, CF_3I, or CO_2. The fluoroolefin compounds and other components of the present inventive compositions are listed in Table 1.

TABLE 1

Compound	Chemical name	Chemical formula
HFC-1225ye	1,2,3,3,3-pentafluoropropene	$CF_3CF=CHF$
HFC-1234ze	1,3,3,3-tetrafluoropropene	$CF_3CH=CHF$
HFC-1234yf	2,3,3,3-tetrafluoropropene	$CF_3CF=CH_2$
HFC-1234ye	1,2,3,3-tetrafluoropropene	$CHF_2CF=CHF$
HFC-1243zf	3,3,3-trifluoropropene	$CF_3CH=CH_2$
HFC-32	difluoromethane	CH_2F_2
HFC-125	pentafluoroethane	CF_3CHF_2
HFC-134	1,1,2,2-tetrafluoroethane	CHF_2CHF_2
HFC-134a	1,1,1,2-tetrafluoroethane	CH_2FCF_3
HFC-143a	1,1,1-trifluoroethane	CH_3CF_3
HFC-152a	1,1-difluoroethane	CHF_2CH_3

CLAIMS

1. A composition comprising- a refrigerant consisting of 40 to 99 weight percent HFC-1234yf and 60 to 1 weight percent HFC-32.

2. The composition of claim 1, said refrigerant consisting of ~~comprising~~ 40 to 95 weight percent HFC-1234yf and 60 to 5 weight percent HFC-32.

3. The composition of claim 1 or 2, said refrigerant consisting of ~~comprising~~ 95 weight percent HFC-1234yf and 5 weight percent HFC-32.

4. The composition of claim 1, 2, or 3, further comprising a lubricant selected from the group consisting of mineral oils, such as paraffins, naphthenes and aromatics, alkylaryls, such as linear and branched alkyl alkylbenzenes, synthetic paraffins, synthetic naphthenes, poly(alphaolefins), polyol esters, polyalkylene glycols, and polyvinyl ethers.

5. The composition of claim 1, 2, or 3, further comprising 0.01 to 5 weight percent of a stabilizer, free radical scavenger, antioxidant or combinations thereof, preferably selected from nitromethane, hindered phenols, hydroxylamines, thiols, phosphites and lactones.

6. The composition of claim 1, 2, or 3, further comprising 0.01 to 5 weight percent of a water scavenger, wherein the water scavenger preferably comprises ortho esters, such as trimethylortho formate, triethylortho formate, or tripropylortho formate.

7. The composition of claim 1, 2, or 3, further comprising a tracer selected from the group consisting of hydrofluorocarbons, deuterated hydrocarbons, deuterated hydrofluorocarbons, perfluorocarbons, fluoroethers, brominated compounds, iodated compounds, alcohols, aldehydes, ketones, nitrous oxide (N2O) and combinations thereof.

8. The composition of claim 7, wherein the tracer or tracer blend is present in the composition at a total concentration of 50 to 1000 parts per million by weight (ppm).

9. The composition of claims 1 to 8 for use in refrigeration, air-conditioning, or heat pump systems.

10. A method of replacing a high GWP refrigerant in a refrigeration, air-conditioning, or heat pump apparatus, wherein said high GWP refrigerant is selected from the group consisting of R134a, R22, R123, R11, R245fa, R114, R236fa, R124, R12, R410A, R407C, R417A, R422A, R507A, R502, and R404A, the method comprising providing the composition of any one of claims 1, 2, or 3 to the refrigeration, air-conditioning, or heat pump apparatus that uses, used or is designed to use the high GWP refrigerant.

11. A refrigeration, air-conditioning, or heat pump apparatus containing the composition of any one of claims 1 to 8.

12. A method of producing heat, the method comprising: condensing the composition of any one of claims 1, 2, or 3 in the vicinity of a body to be heated and thereafter evaporating the composition.

13. A method of producing cooling, the method comprising: evaporating the composition of any one of claims 1, 2, or 3 in the vicinity of a body to be cooled and thereafter condensing the composition.