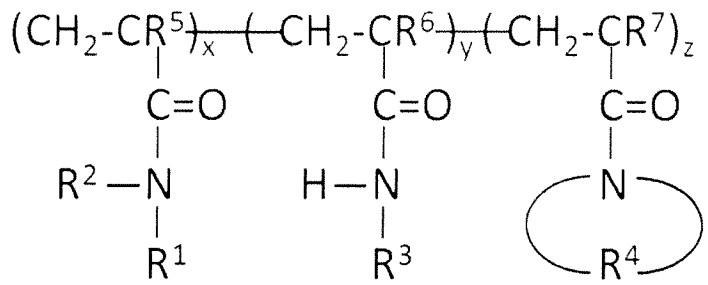
CLAIMS

1. A terpolymer having General Formula (I):



(I)

in which:

R^1, R^2, and R^3 are each independently chosen from C_1 to C_8 saturated aliphatic groups,

R^4 is chosen from divalent C_4 to C_7 linear aliphatic groups or divalent C_4 to C_7 linear heteroaliphatic groups, optionally substituted with one or more C_1-C_6 linear aliphatic groups, C_1-C_6 branched aliphatic groups, or combination thereof, where the divalent C_4 to C_7 linear heteroaliphatic groups comprise 1 or 2 heteroatoms independently chosen from O, N, or S,

R^5, R^6, and R^7 are each independently chosen from methyl or hydrogen,

x is a molar fraction range chosen from greater than 0 to 0.8,

y is a molar fraction range chosen from greater than 0 to 0.8,

z is a molar fraction range chosen from 0.1 to 0.9, where the summation of x, y, and z equals 1, and

the terpolymer is random.

2. The terpolymer of claim 1, where:

R^4 is chosen from divalent C_4 to C_7 linear aliphatic groups,

x is a molar fraction range chosen from greater than 0 to 0.5,

y is a molar fraction range chosen from greater than 0 to 0.5, and

z is a molar fraction range chosen from 0.2 to 0.75.

3. The terpolymer of claim 1, where:

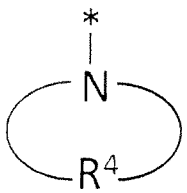
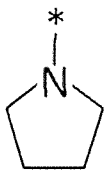
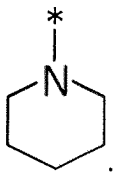
R^1, R^2, and R^3 are each independently chosen from methyl, ethyl, *n*-propyl, isopropyl, *n*-butyl, *sec*-butyl, isobutyl, *tert*-butyl, *n*-pentyl, *sec*-pentyl, isopentyl, *tert*-pentyl, *n*-hexyl, or *sec*-hexyl,

R^4 is chosen from divalent C_4 to C_6 linear aliphatic groups,

x is a molar fraction range chosen from greater than 0 to 0.2,

y is a molar fraction range chosen from greater than 0 to 0.5, and

z is a molar fraction range chosen from 0.2 to 0.75.

4. The terpolymer of claim 1, where  is chosen from  or .

5. The terpolymer of claim 1, where:

R^1 is methyl,

R^2 is methyl,

R^3 is isopropyl,

x is a molar fraction range chosen from 0.5 to 0.75,

y is a molar fraction range chosen from 0.1 to 0.25, and

z is a molar fraction range chosen from 0.1 to 0.25.

6. The terpolymer of claim 1, where:

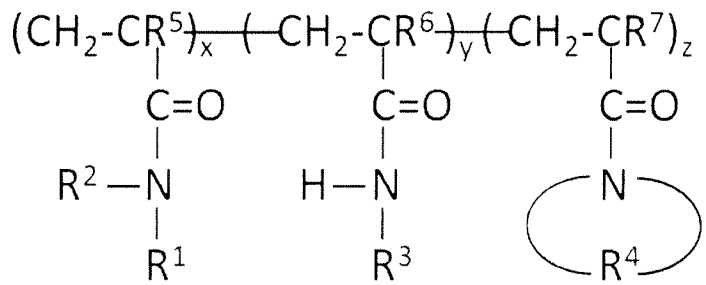
x is a molar fraction range chosen from 0.5 to 0.75, and

z is a molar fraction range chosen from 0.25 to 0.5.

7. The terpolymer of claim 1, where the viscosity average molecular weight of the terpolymer is in the range of from 1,000 g/mol to 1,000,000 g/mol.

8. A method for inhibiting formation of clathrate hydrates in a fluid capable of forming the clathrate hydrates, the method comprising:

contacting the fluid with at least one terpolymer of General Formula (I) under conditions suitable for forming the clathrate hydrates:



(I)

in which:

R^1, R^2, and R^3 are each independently chosen from C_1 to C_8 saturated aliphatic groups,

R^4 is chosen from divalent C_4 to C_7 linear aliphatic groups or divalent C_4 to C_7 linear heteroaliphatic groups, optionally substituted with one or more C_1-C_6 linear aliphatic groups, C_1-C_6 branched aliphatic groups, or combination thereof, where the divalent C_4 to C_7 linear heteroaliphatic

groups comprise 1 or 2 heteroatoms independently chosen from O, N, or S,

R^5, R^6, and R^7 are each independently chosen from methyl or hydrogen,

x is a molar fraction range chosen from greater than 0 to 0.8,

y is a molar fraction range chosen from greater than 0 to 0.8,

z is a molar fraction range chosen from 0.1 to 0.9, where the summation of x, y, and z equals 1, and

the at least one terpolymer is random.

9. The method of claim 8, where the fluid comprises water host molecules and natural gas guest molecules chosen from methane, ethane, propane, butane, pentane, carbon dioxide, hydrogen sulfide, nitrogen, or combination thereof.

10. The method of claim 8, where the fluid comprises acid gas guest molecules.

11. The method of claim 8, where:

the clathrate hydrates comprise SI clathrate hydrates, SII clathrate hydrates, or combination thereof and

the contacting inhibits formation of the SI clathrate hydrates, the SII clathrate hydrates, or the combination thereof.

12. The method of claim 8, where the contacting inhibits the formation of the clathrate hydrates at a first subcooling temperature of from 0 °C to 4.0 °C.

13. The method of claim 8, where the contacting inhibits the formation of the clathrate hydrates in a pressure range of from 40 bars to 200 bars.

14. The method of claim 8, where the fluid is contacted with a composition comprising the at least one terpolymer of Formula (I) and at least one of a corrosion inhibitor or solvent.

15. The method of claim 8, where:

R^4 is chosen from divalent C_4 to C_7 linear aliphatic groups,

x is a molar fraction range chosen from greater than 0 to 0.5,

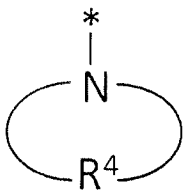
y is a molar fraction range chosen from greater than 0 to 0.5, and

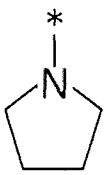
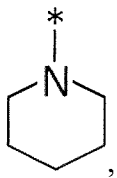
z is a molar fraction range chosen from 0.2 to 0.75.

16. The method of claim 8, where

R^4 is chosen from divalent C_4 to C_7 linear aliphatic groups.

17. The method of claim 8, where:



is chosen from  or ,

x is a molar fraction range chosen from 0.5 to 0.75,

y is a molar fraction range chosen from 0.1 to 0.25, and

z is a molar fraction range chosen from 0.1 to 0.25.

18. The method of claim 8, where the viscosity average molecular weight of the at least one terpolymer is in the range of from 1,500 g/mol to 20,000 g/mol.

19. The method of claim 8, where the fluid is contacted with the at least one terpolymer at a tie-in platform.