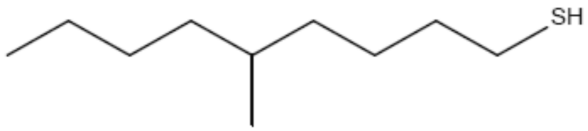
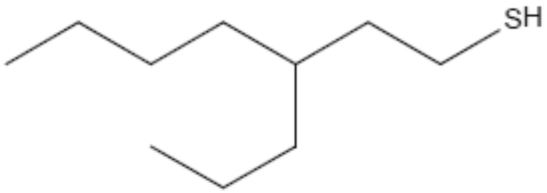
CLAIMS

What is claimed is:

1. A composition comprising mercaptans, wherein at least 50 wt.% of the mercaptans are branched C_{10} mercaptans selected from the group consisting of 5-methyl-1-mercapto-nonane (represented by Structure A), 3-propyl-1-mercapto-heptane (represented by Structure B), 4-ethyl-1-mercapto-octane (represented by Structure C), 2-butyl-1-mercapto-hexane (represented by Structure D), 5-methyl-2-mercapto-nonane (represented by Structure E), 3-propyl-2-mercapto-heptane (represented by Structure F), 4-ethyl-2-mercapto-octane (represented by Structure G), 5-methyl-5-mercapto-nonane (represented by Structure H), and combinations thereof.



Structure A



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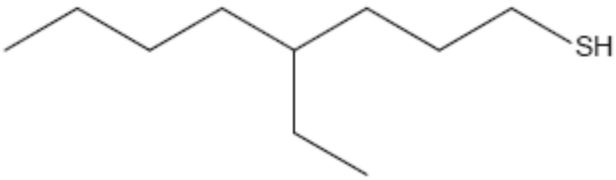

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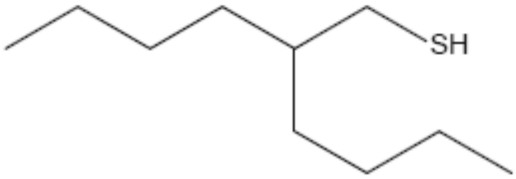

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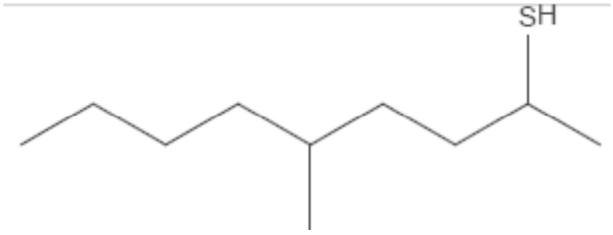

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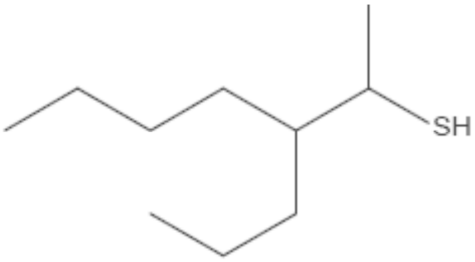

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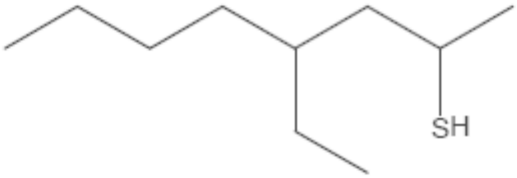
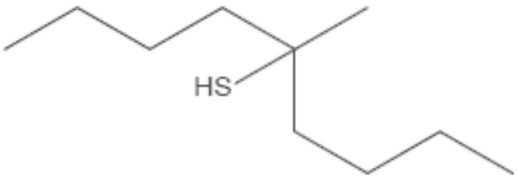
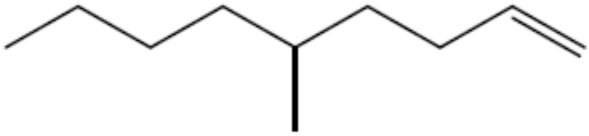


Structure G

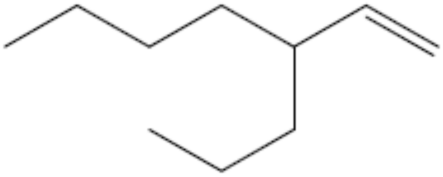


Structure H

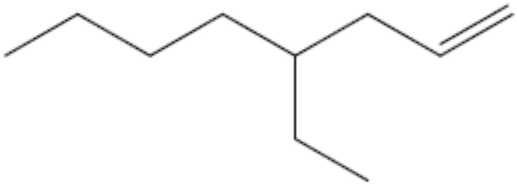
2. A composition comprising sulfides, wherein at least 50 wt.% of the sulfides are branched C_{20} sulfides represented by the structure R^1-S-R^2, wherein R^1 and R^2 are each independently a functional group derived from an olefin, wherein the olefin comprises 5-methyl-1-nonene (represented by Structure I), 3-propyl-1-heptene (represented by Structure J), 4-ethyl-1-octene (represented by Structure K), 2-butyl-1-hexene (represented by Structure L), or combinations thereof.



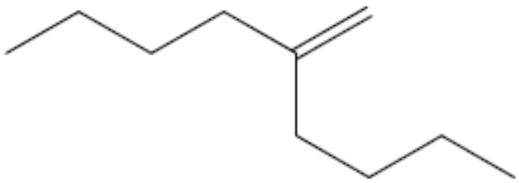
Structure I



Structure J



Structure K



Structure L

3. The composition of claim 2, wherein the olefin comprises a) at least 76 mol% C_{10} monoolefins, the C_{10} monoolefins comprising i) at least 3 mol% 2-butyl-1-hexene

(represented by Structure L), ii) at least 8 mol% 3-propyl-1-heptene (represented by Structure J), iii) at least 6 mol% 4-ethyl-1-octene (represented by Structure K), and iv) at least 20 mol% 5-methyl-1-nonene (represented by Structure I); and b) at least 1 mol% C_{14} monoolefins.

4. The composition of claim 3, wherein the C_{10} monoolefins comprise from 1 mol% to 16 mol% 4-decene and/or 5-decene.

5. The composition of claim 3, wherein the C_{10} monoolefins comprise from 0.5 mol% to 9 mol% 1-decene.

6. The composition of claim 2, wherein the olefin further comprises from 0.1 mol% to 5 mol% C_{12} monoolefins, the C_{12} monoolefins comprising from 54 mol% to 74 mol% 1-dodecene.

7. The composition of claim 2, wherein the olefin further comprises from 0.1 mol% to 5 mol% C_8 monoolefins, the C_8 monoolefins comprising at least 95 mol% 1-octene.

8. The composition of claim 2, wherein the olefin further comprises from 0.05 mol% to 2 mol% C_{16} monoolefins and/or C_{18} monoolefins.

9. A composition comprising:

(A) at least 25 wt.% C_{10} mercaptans selected from the group consisting of 5-methyl-1-mercapto-nonane (represented by Structure A), 3-propyl-1-mercapto-heptane (represented by Structure B), 4-ethyl-1-mercapto-octane (represented by Structure C), 2-butyl-1-mercapto-hexane (represented by Structure D), 5-methyl-2-mercapto-nonane (represented by Structure E), 3-propyl-2-mercapto-heptane (represented by Structure F), 4-ethyl-2-mercapto-octane (represented by Structure G), 5-methyl-5-mercapto-nonane (represented by Structure H), and combinations thereof; and

(B) at least 5 wt.% C_{20} sulfides represented by the structure R^1-S-R^2, wherein R^1 and R^2 are each independently a functional group derived from an olefin, wherein the olefin comprises 5-methyl-1-nonene (represented by Structure I), 3-propyl-1-heptene (represented by Structure J), 4-ethyl-1-octene (represented by Structure K), 2-butyl-1-hexene (represented by Structure L), or combinations thereof.

10. A composition comprising:

(A) from at least 50 wt.% to at least 90 wt.% mercaptans, wherein at least 50 wt.% of the mercaptans are branched C_{10} mercaptans selected from the group consisting of 5-methyl-1-mercapto-nonane (represented by Structure A), 3-propyl-1-mercapto-heptane (represented by Structure B), 4-ethyl-1-mercapto-octane (represented by Structure C), 2-butyl-1-mercapto-hexane (represented by Structure D), 5-methyl-2-mercapto-nonane (represented by Structure E), 3-propyl-2-mercapto-heptane (represented by Structure F), 4-ethyl-2-mercapto-octane (represented by Structure G), 5-methyl-5-mercapto-nonane (represented by Structure H), and combinations thereof; and

(B) from at least 10 wt.% to at least 30 wt.% sulfides, wherein at least 50 wt.% of the sulfides are branched C_{20} sulfides represented by the structure R^1-S-R^2, wherein R^1 and R^2 are each independently a functional group derived from an olefin selected from the group consisting of 5-methyl-1-nonene (represented by Structure I), 3-propyl-1-heptene (represented by Structure J), 4-ethyl-1-octene (represented by Structure K), 2-butyl-1-hexene (represented by Structure L), and combinations thereof.

11. A composition comprising:

(A) at least 25 wt.% C_{10} mercaptans selected from the group consisting of 5-methyl-1-mercapto-nonane (represented by Structure A), 3-propyl-1-mercapto-heptane (represented by Structure B), 4-ethyl-1-mercapto-octane (represented by Structure C), 2-butyl-1-mercapto-hexane (represented by Structure D), 5-methyl-2-mercapto-nonane (represented by Structure E), 3-propyl-2-mercapto-heptane (represented by Structure F), 4-ethyl-2-mercapto-octane (represented by Structure G), 5-methyl-5-mercapto-nonane (represented by Structure H), and combinations thereof;

(B) at least 5 wt.% C_{20} sulfides represented by the structure R^1-S-R^2, wherein R^1 and R^2 are each independently a functional group derived from an olefin, wherein the olefin comprises 5-methyl-1-nonene (represented by Structure I), 3-propyl-1-heptene (represented by Structure J), 4-ethyl-1-octene (represented by Structure K), 2-butyl-1-hexene (represented by Structure L), or combinations thereof; and

one or more of the following components (C) – (I):

(C) less than 5 wt.% C_8 mercaptans;

(D) less than 15 wt.% C_{12} mercaptans;

(E) less than 15 wt.% C_{14} mercaptans;

(F) less than 5 wt.% C_{16} mercaptans and/or C_{18} mercaptans;

(G) less than 1 wt.% C_{16-36} sulfides represented by the structure R^3-S-R^4, wherein R^3 and R^4 are each independently a functional group derived from an olefin selected from the group consisting of C_8 monoolefins, C_{10} monoolefins, C_{12} monoolefins, C_{14} monoolefins, C_{16} monoolefins, and C_{18} monoolefins, wherein R^3 and R^4 are not both branched C_{10} monoolefins;

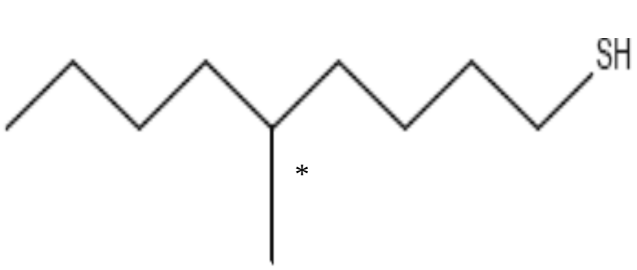
(H) less than 10 wt.% unreacted C_{8-18} monoolefins; and

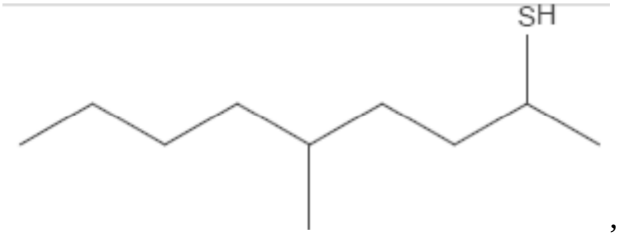
(I) less than 10 wt.% non-olefin impurities selected from the group consisting of C_{8-14} alkanes, cyclohexane, methylcyclopentane, methylcyclohexane, benzene, toluene, ethylbenzene, xylene, mesitylene, hexamethylbenzene, C_{4-12} alcohols, 2-ethyl-1-hexanol, and 2-ethylhexyl-2-ethylhexanoate.

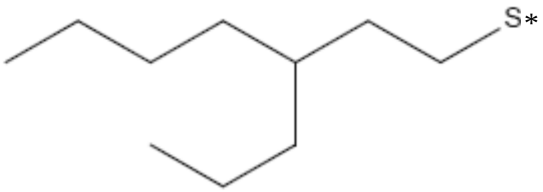
12. A process comprising reacting hydrogen sulfide (H_2S) and a feedstock comprising one or more branched C_{10} monoolefins in the presence of an initiating agent to produce a crude composition, wherein the branched C_{10} monoolefins comprise 5-methyl-1-nonene (represented by Structure I), 3-propyl-1-heptene (represented by Structure J), 4-ethyl-1-octene (represented by Structure K), 2-butyl-1-hexene (represented by Structure L), or combinations thereof.

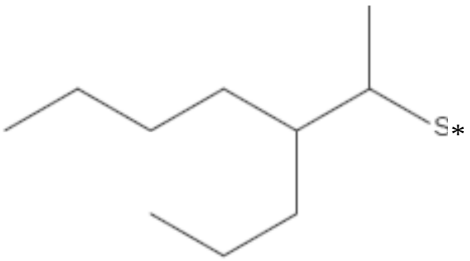
13. The process of claim 12 further comprising recovering a first reaction product from the crude composition, wherein the first reaction product comprises at least 25 wt.% branched C_{10} mercaptans.

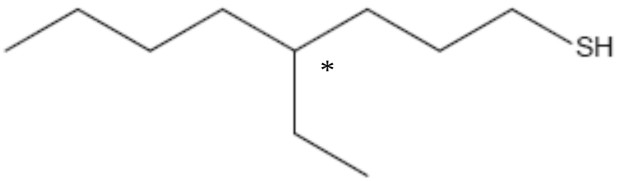
14. The process of claim 12 further comprising recovering a second reaction product from the crude composition, wherein the second reaction product comprises at least 5 wt.% branched C_{20} sulfides represented by structure R^1-S-R^2, wherein R^1 and R^2 are each independently a branched C_{10} alkyl group derived from the branched C_{10} monoolefin, and wherein the branched C_{10} alkyl group is selected from the group consisting of

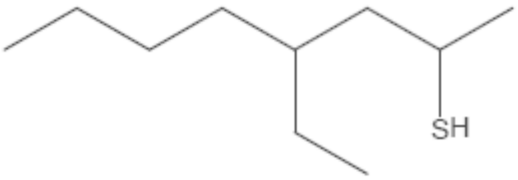


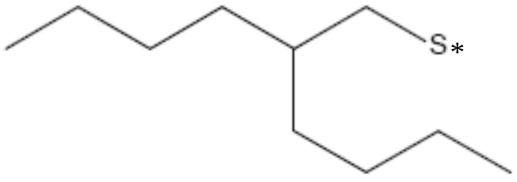


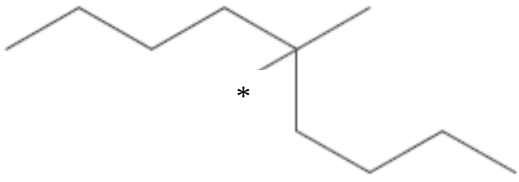












, and ;

wherein * designates the attachment point to the S atom of the branched C_{20} sulfide.

15. The process of claim 12 further comprising recovering a reaction product from the crude composition, wherein the reaction product comprises (i) at least 50 wt.% mercaptans, wherein at least 50 wt.% of the mercaptans are branched C_{10} mercaptans selected from the group consisting of 5-methyl-1-mercapto-nonane (represented by Structure A), 3-propyl-1-mercapto-heptane (represented by Structure B), 4-ethyl-1-mercapto-octane (represented by Structure C), 2-butyl-1-mercapto-hexane (represented by Structure D), 5-methyl-2-mercapto-nonane (represented by Structure E), 3-propyl-2-mercapto-heptane (represented by Structure F), 4-ethyl-2-mercapto-octane (represented by Structure G), 5-methyl-5-mercapto-nonane (represented by Structure H), and combinations thereof; and (ii) at least 10 wt.% sulfides, wherein at least 50 wt.% of the sulfides are branched C_{20} sulfides represented by the structure R^1-S-R^2, wherein R^1 and R^2 are each independently a functional group derived from an olefin, wherein the olefin comprises 5-methyl-1-nonene (represented by Structure I), 3-propyl-1-heptene (represented by Structure J), 4-ethyl-1-octene (represented by Structure K), 2-butyl-1-hexene (represented by Structure L), or combinations thereof.

16. The process of claim 12, wherein the initiating agent comprises ultraviolet radiation.

17. The process of claim 16, wherein the initiating agent further comprises a phosphite promoter, a photoinitiator, or both.

18. The process of claim 12, wherein the initiating agent comprises an acid catalyst.

19. The process of claim 12, wherein the initiating agent comprises a hydrodesulfurization catalyst.

20. The process of claim 16, wherein the crude composition comprises C_{10} mercaptans comprising from 70 wt.% to 95 wt.% C_{10} primary mercaptans, from 10 wt.% to 20 wt.% C_{10} secondary mercaptans, and from 0 wt.% to 5 wt.% C_{10} tertiary mercaptans.

21. The process of claim 18, wherein the crude composition comprises C_{10} mercaptans comprising from 0 wt.% to 5 wt.% C_{10} primary mercaptans, from 80 wt.% to 95 wt.% C_{10} secondary mercaptans, and from 5 wt.% to 20 wt.% C_{10} tertiary mercaptans.

22. The process of claim 19, wherein the crude composition comprises C_{10} mercaptans comprising from 5 wt.% to 30 wt.% C_{10} primary mercaptans, from 60 wt.% to 75 wt.% C_{10} secondary mercaptans, and from 5 wt.% to 15 wt.% C_{10} tertiary mercaptans.

23. The process of claim 12 further comprising, prior to the reacting, separating the feedstock comprising one or more branched C_{10} monoolefins from an effluent stream obtained from a 1-hexene production process.