We claim:

1. A process for producing a denatured ethanol composition, the process comprising:

hydrogenating an acetic acid feed in the presence of a catalyst to form a crude ethanol product comprising ethanol and at least one denaturant;

separating the crude ethanol product in one or more separation units into a denatured ethanol composition and one or more derivative streams, wherein the denatured ethanol composition comprises from 0.01 wt.% to 40 wt % denaturant, based on the total weight of the denatured ethanol composition.

2. The process of claim 1, wherein the at least one denaturant is selected from the group consisting of acetaldehyde, acetaldol, ethyl ether, and methanol.

3. The process as in any one of claims 1 and 2, wherein the at least one denaturant comprises ethyl acetate.

4. The process as in one of claims 1-3, wherein the at least one denaturant comprises acetaldehyde.

5. The process as in one of claims 1-3, wherein the at least one denaturant comprises isopropanol.

6. The process as in one of claims 1-3, wherein the at least one denaturant comprises diethyl ether.

7. The process as in one of claims 1-3, wherein the at least one denaturant comprises acetic acid.

8. The process as in one of claims 1-3, wherein the denatured ethanol composition comprises from 50 wt.% to 99 wt.% ethanol.

9. The process as in one of claims 1-8, wherein the acetic acid feed comprises acetic acid and propionic acid.

10. The process of claim 9, wherein the propionic acid is hydrogenated to produce n-propanol.

11. The process of claim 10, further comprising:

separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol and n-propanol, and a first residue comprising acetic acid;

separating, in a second column, at least a portion of the first distillate into a second distillate and a second residue comprising ethanol, at least a portion of the n-propanol, and water; and

separating, in a third column, at least a portion of the second residue into a third distillate comprising ethanol and a third residue comprising water.

12. The process of claim 11, further comprising:

withdrawing, from the third column, a side stream comprising n-propanol.

13. The process as in one of claims 1-12, wherein the crude ethanol product further comprises:

from 0.01 wt.% to 20 wt.% ethyl acetate;

from 0.01 wt.% to 10 wt.% acetaldehyde;

from 0.01 wt.% to 10 wt.% isopropanol;

from 0.01 wt.% to 20 wt.% diethyl ether;

from 0 wt.% to 90 wt.% acetic acid; and

from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

14. The process as in one of claims 1-13, wherein the acetic acid feed comprises acetic acid and acetone, and the at least one denaturant comprises isopropanol.

15. The process as in one of claims 1-14, further comprising contacting acetic acid and hydrogen, in an auxiliary reactor, under conditions effective to form the acetone.

16. The process as in one of claims 1-14, wherein the denatured ethanol composition, as formed, comprises from 0.1 wt.% to 10 wt % isopropanol, based on the total weight of the denatured ethanol composition.

17. The process as in one of claims 1-16, wherein the separating comprises:

separating a first portion of the crude ethanol product into an ethanol stream and the one or more derivative streams;

purifying the ethanol stream to form a purified ethanol stream; and

combining a second portion of the crude ethanol product with the purified ethanol stream to form the denatured ethanol composition.

18. The process as in one of claims 1-17, wherein the separating comprises:

separating at least a portion of the crude ethanol product into an ethanol stream and the one or more derivative stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the acetic acid feed with the purified ethanol stream to form the denatured ethanol composition.

19. The process as in one of claims 1-18, further comprising:

separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol, acetaldehyde, and ethyl acetate, and a first residue comprising acetic acid.

20. The process as in one of claims 1-19, further comprising:

separating at least a portion of the first distillate into an ethanol stream and a denaturant stream comprising acetaldehyde and ethyl acetate;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the denaturant stream and the purified ethanol stream to form the denatured ethanol composition.

21. The process as in one of claims 1-19, further comprising:

separating at least a portion of the first distillate into an ethanol stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the first residue and the purified ethanol stream to form the denatured ethanol composition.

22. The process as in one of claims 1-19, further comprising:

separating, in a second column, at least a portion of the first distillate into a second distillate comprising ethyl acetate and/or acetaldehyde, and an ethanol stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the second distillate and the purified ethanol stream to form the denatured ethanol composition.

23. The process of claim 22, wherein the second column is an extractive distillation column.

24. The process as in one of claims 1-19, further comprising:

separating, in a second column, at least a portion of the first distillate into a second residue comprising ethyl acetate, and an ethanol stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the second residue and the purified ethanol stream to form the denatured ethanol composition.

25. The process of claim 24, wherein the second column is a non-extractive distillation column.

26. The process as in one of claims 1-19, further comprising:

separating, in a second column, at least a portion of the first distillate into a second residue comprising ethyl acetate, and an ethanol stream;

separating, in a third column, at least a portion of the second residue into a third distillate comprising ethyl acetate and ethanol.

27. The process as in one of claims 1-26, wherein the denaturant comprises ethyl acetate, and wherein the denatured ethanol composition further comprises:

from 0.01 wt.% to 40 wt.% ethyl acetate;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

28. The process as in one of claims 1-26, wherein the denaturant comprises acetaldehyde, and wherein the denatured ethanol composition further comprises:

from 0.01 wt.% to 10 wt.% acetaldehyde;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

29. The process as in one of claims 1-26, wherein the denaturant comprises isopropanol, and wherein the denatured ethanol composition further comprises:

from 0.1 wt.% to 10 wt.% isopropanol;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

30. The process as in one of claims 1-26, wherein the denaturant comprises diethyl ether, and wherein the denatured ethanol composition further comprises:

from 0.1 wt.% to 20 wt.% diethyl ether;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

31. The process as in one of claims 1-26, wherein the denaturant comprises acetic acid, and wherein the denatured ethanol composition further comprises:

from 0.01 wt.% to 20 wt.% acetic acid

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

32. The process as in one of claims 1-26, wherein the denaturant comprises n-propanol, and wherein the denatured ethanol composition further comprises:

from 0.1 wt.% to 10 wt.% n-propanol

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

33. A denatured ethanol composition formed by the process as in one of claims 1-32.

34. A fuel composition comprising the denatured ethanol composition of claim 33.

35. A feed stock for ester production comprising the denatured ethanol composition of claim 33.

36. A solvent comprising the denatured ethanol composition of claim 33.

37. A process for producing a denatured ethanol composition, the process comprising:

hydrogenating an acetic acid feed in the presence of a catalyst to form a crude ethanol product comprising ethanol and a denaturant;

separating the crude ethanol product into an ethanol stream and at least one derivative stream comprising denaturant;

further purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the at least one derivative stream with the purified ethanol stream to produce the denatured ethanol composition.

38. The process of claim 37, wherein the denatured ethanol composition comprises from 50 to 99 wt.% ethanol, and from 0.01 to 40 wt.% denaturant.

39. The process of claim 37, wherein the crude ethanol product comprises
from 5 wt.% to 70 wt.% ethanol;
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 0.01 wt.% to 10 wt.% isopropanol;
from 0.01 wt.% to 20 wt.% diethyl ether;
from 0.01 wt.% to 20 wt.% ethyl acetate;
from 0 wt.% to 90 wt.% acetic acid; and
from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

40. The process as in one of claims 37-39, wherein the denaturant is selected from the group consisting of acetaldehyde, acetaldol, ethyl ether, and methanol.

41. The process as in one of claims 37-40, wherein the denaturant is ethyl acetate.

42. The process as in one of claims 37-41, further comprising
separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol and denaturant, and a first residue comprising acetic acid;
separating, in a second column, at least a portion of the first distillate into a second distillate comprising denaturant and a second residue comprising the ethanol stream; and
separating, in a third column, at least a portion of the ethanol stream into a third distillate comprising the purified ethanol streamand a third residue comprising water.

43. The process of claim 42, further comprising adding at least a portion of the second distillate to at least a portion of the purified ethanol stream to produce the denatured ethanol composition.

44. A process for producing a denatured ethanol composition, the process comprising:

hydrogenating an acetic acid feed comprising acetic acid and acetone in the presence of a catalyst to form a crude ethanol product comprising ethanol and isopropanol;

separating the crude ethanol product in one or more separation units into a denatured ethanol composition and one or more derivative streams, wherein the denatured ethanol composition, as formed, comprises ethanol and from 0.1 wt.% to 10 wt.% isopropanol, based on the total weight of the denatured ethanol composition.

45. The process of claim 44, wherein the crude ethanol product comprises
from 5 wt.% to 70 wt.% ethanol;
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 0.01 wt.% to 10 wt.% isopropanol;
from 0 wt.% to 20 wt.% ethyl acetate; and
from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

46. A denatured ethanol composition formed by the process as in one of claims 37-45.

Marked Up Version of Amendments

1. A process for producing a denatured ethanol composition, the process comprising:

hydrogenating an acetic acid feed in the presence of a catalyst to form a crude ethanol product comprising ethanol and at least one denaturant;

separating the crude ethanol product in one or more separation units into a denatured ethanol composition and one or more derivative streams, wherein the denatured ethanol composition comprises from 0.01 wt.% to 40 wt % denaturant, based on the total weight of the denatured ethanol composition.

2. The process of claim 1, wherein the at least one denaturant is selected from the group consisting of acetaldehyde, acetaldol, ethyl ether, and methanol.

3. The process as in any one of claims 1 and 2, wherein the at least one denaturant comprises ethyl acetate.

4. The process as in one of claims 1-3, wherein the at least one denaturant comprises acetaldehyde.

5. The process as in one of claims 1-3, wherein the at least one denaturant comprises isopropanol.

6. The process as in one of claims 1-3, wherein the at least one denaturant comprises diethyl ether.

7. The process as in one of claims 1-3, wherein the at least one denaturant comprises acetic acid.

8. The process as in one of claims 1-3, wherein the denatured ethanol composition comprises from 50 wt.% to 99 wt.% ethanol.

9. The process as in one of claims 1-8, wherein the acetic acid feed comprises acetic acid and propionic acid.

10. The process of claim 9, wherein the propionic acid is hydrogenated to produce n-propanol.

11. The process of claim 10, further comprising:

separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol and n-propanol, and a first residue comprising acetic acid;

separating, in a second column, at least a portion of the first distillate into a second distillate and a second residue comprising ethanol, at least a portion of the n-propanol, and water; and

separating, in a third column, at least a portion of the second residue into a third distillate comprising ethanol and a third residue comprising water.

12. The process of claim 11, further comprising:

withdrawing, from the third column, a side stream comprising n-propanol.

13. The process as in one of claims 1-12, wherein the crude ethanol product further comprises:

from 0.01 wt.% to 20 wt.% ethyl acetate;

from 0.01 wt.% to 10 wt.% acetaldehyde;

from 0.01 wt.% to 10 wt.% isopropanol;

from 0.01 wt.% to 20 wt.% diethyl ether;

from 0 wt.% to 90 wt.% acetic acid; and

from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

14. The process as in one of claims 1-13, wherein the acetic acid feed comprises acetic acid and acetone, and the at least one denaturant comprises isopropanol.

15. The process as in one of claims 1-14, further comprising contacting acetic acid and hydrogen, in an auxiliary reactor, under conditions effective to form the acetone.

16. The process as in one of claims 1-14, wherein the denatured ethanol composition, as formed, comprises from 0.1 wt.% to 10 wt % isopropanol, based on the total weight of the denatured ethanol composition.

17. The process as in one of claims 1-16, wherein the separating comprises:

separating a first portion of the crude ethanol product into an ethanol stream and the one or more derivative streams;

purifying the ethanol stream to form a purified ethanol stream; and

combining a second portion of the crude ethanol product with the purified ethanol stream to form the denatured ethanol composition.

18. The process as in one of claims 1-17, wherein the separating comprises:

separating at least a portion of the crude ethanol product into an ethanol stream and the one or more derivative stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the acetic acid feed with the purified ethanol stream to form the denatured ethanol composition.

19. The process as in one of claims 1-18, further comprising:

separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol, acetaldehyde, and ethyl acetate, and a first residue comprising acetic acid.

20. The process as in one of claims 1-19, further comprising:

separating at least a portion of the first distillate into an ethanol stream and a denaturant stream comprising acetaldehyde and ethyl acetate;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the denaturant stream and the purified ethanol stream to form the denatured ethanol composition.

21. The process as in one of claims 1-19, further comprising:

separating at least a portion of the first distillate into an ethanol stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the first residue and the purified ethanol stream to form the denatured ethanol composition.

22. The process as in one of claims 1-19, further comprising:

separating, in a second column, at least a portion of the first distillate into a second distillate comprising ethyl acetate and/or acetaldehyde, and an ethanol stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the second distillate and the purified ethanol stream to form the denatured ethanol composition.

23. The process of claim 22, wherein the second column is an extractive distillation column.

24. The process as in one of claims 1-19, further comprising:

separating, in a second column, at least a portion of the first distillate into a second residue comprising ethyl acetate, and an ethanol stream;

purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the second residue and the purified ethanol stream to form the denatured ethanol composition.

25. The process of claim 24, wherein the second column is a non-extractive distillation column.

26. The process as in one of claims 1-19, further comprising:

separating, in a second column, at least a portion of the first distillate into a second residue comprising ethyl acetate, and an ethanol stream;

separating, in a third column, at least a portion of the second residue into a third distillate comprising ethyl acetate and ethanol.

27. The process as in one of claims 1-26, wherein the denaturant comprises ethyl acetate, and wherein the denatured ethanol composition further comprises:

from 0.01 wt.% to 40 wt.% ethyl acetate;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

28. The process as in one of claims 1-26, wherein the denaturant comprises acetaldehyde, and wherein the denatured ethanol composition further comprises:

from 0.01 wt.% to 10 wt.% acetaldehyde;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

29. The process as in one of claims 1-26, wherein the denaturant comprises isopropanol, and wherein the denatured ethanol composition further comprises:

from 0.1 wt.% to 10 wt.% isopropanol;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

30. The process as in one of claims 1-26, wherein the denaturant comprises diethyl ether, and wherein the denatured ethanol composition further comprises:

from 0.1 wt.% to 20 wt.% diethyl ether;

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

31. The process as in one of claims 1-26, wherein the denaturant comprises acetic acid, and wherein the denatured ethanol composition further comprises:

from 0.01 wt.% to 20 wt.% acetic acid

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

32. The process as in one of claims 1-26, wherein the denaturant comprises n-propanol, and wherein the denatured ethanol composition further comprises:

from 0.1 wt.% to 10 wt.% n-propanol

from 50 wt.% to 99 wt.% ethanol; and

from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

33. A denatured ethanol composition formed by the process as in one of claims 1-32.

34. A fuel composition comprising the denatured ethanol composition of claim 33.

35. A feed stock for ester production comprising the denatured ethanol composition of claim 33.

36. A solvent comprising the denatured ethanol composition of claim 33.

37. A process for producing a denatured ethanol composition, the process comprising:

hydrogenating an acetic acid feed in the presence of a catalyst to form a crude ethanol product comprising ethanol and a denaturant;

separating the crude ethanol product into an ethanol stream and at least one derivative stream comprising denaturant;

further purifying the ethanol stream to form a purified ethanol stream; and

combining at least a portion of the at least one derivative stream with the purified ethanol stream to produce the denatured ethanol composition.

38. The process of claim 37, wherein the denatured ethanol composition comprises from 50 to 99 wt.% ethanol, and from 0.01 to 40 wt.% denaturant.

39. The process of claim 37, wherein the crude ethanol product comprises
from 5 wt.% to 70 wt.% ethanol;
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 0.01 wt.% to 10 wt.% isopropanol;
from 0.01 wt.% to 20 wt.% diethyl ether;
from 0.01 wt.% to 20 wt.% ethyl acetate;
from 0 wt.% to 90 wt.% acetic acid; and
from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

40. The process as in one of claims 37-39, wherein the denaturant is selected from the group consisting of acetaldehyde, acetaldol, ethyl ether, and methanol.

41. The process as in one of claims 37-40, wherein the denaturant is ethyl acetate.

42. The process as in one of claims 37-41, further comprising
separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol and denaturant, and a first residue comprising acetic acid;
separating, in a second column, at least a portion of the first distillate into a second distillate comprising denaturant and a second residue comprising the ethanol stream; and
separating, in a third column, at least a portion of the ethanol stream into a third distillate comprising the purified ethanol streamand a third residue comprising water.

43. The process of claim 42, further comprising adding at least a portion of the second distillate to at least a portion of the purified ethanol stream to produce the denatured ethanol composition.

44. A process for producing a denatured ethanol composition, the process comprising:
hydrogenating an acetic acid feed comprising acetic acid and acetone in the presence of a catalyst to form a crude ethanol product comprising ethanol and isopropanol;
separating the crude ethanol product in one or more separation units into a denatured ethanol composition and one or more derivative streams, wherein the denatured ethanol

composition, as formed, comprises ethanol and from 0.1 wt.% to 10 wt.% isopropanol, based on the total weight of the denatured ethanol composition.

45. The process of claim 44, wherein the crude ethanol product comprises
from 5 wt.% to 70 wt.% ethanol;
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 0.01 wt.% to 10 wt.% isopropanol;
from 0 wt.% to 20 wt.% ethyl acetate; and
from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

46. A denatured ethanol composition formed by the process as in one of claims 37-45.

47. The process as in one of claims 1-3, wherein the hydrogenation is conducted in the vapor phase.

48. The process as in one of claims 1-3, wherein the denaturant is present in an amount less than the azeotropic amount.

We Claim:

1. A process for producing a denatured ethanol composition, the process comprising:
hydrogenating an acetic acid feed in the presence of a catalyst to form a crude ethanol product comprising ethanol and at least one denaturant;
separating the crude ethanol product in one or more separation units into a denatured ethanol composition and one or more derivative streams,
wherein the denatured ethanol composition comprises from 0.01 wt.% to 40 wt % denaturant, based on the total weight of the denatured ethanol composition, and
wherein the at least one denaturant comprises acetaldehyde.

2. The process of claim 1, wherein the at least one denaturant further comprises at least one of the group consisting of acetaldol, an ethyl ether, ethyl acetate, isopropanol, diethyl ether, acetic acid, and methanol.

3. The process as in any one of claims 1 and 2, wherein the at least one denaturant further comprises ethyl acetate.

4. The process as in one of claims 1-3, wherein the at least one denaturant further comprises isopropanol.

5. The process as in one of claims 1-3, wherein the at least one denaturant further comprises diethyl ether.

6. The process as in one of claims 1-3, wherein the at least one denaturant further comprises acetic acid.

7. The process as in one of claims 1-3, wherein the denatured ethanol composition comprises from 50 wt.% to 99 wt.% ethanol.

8. The process as in one of claims 1-7, wherein the acetic acid feed comprises acetic acid and propionic acid.

9. The process of claim 8, wherein the propionic acid is hydrogenated to produce n-propanol.

10. The process of claim 9, further comprising:
separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol and n-propanol, and a first residue comprising acetic acid;
separating, in a second column, at least a portion of the first distillate into a second distillate and a second residue comprising ethanol, at least a portion of the n-propanol, and water; and

separating, in a third column, at least a portion of the second residue into a third distillate comprising ethanol and a third residue comprising water.

11. The process of claim 10, further comprising:
withdrawing, from the third column, a side stream comprising n-propanol.

12. The process as in one of claims 1-11, wherein the acetic acid feed comprises acetic acid and acetone, and the at least one denaturant comprises isopropanol.

13. The process as in one of claims 1-12, further comprising contacting acetic acid and hydrogen, in an auxiliary reactor, under conditions effective to form the acetone.

14. The process as in one of claims 1-12, wherein the denatured ethanol composition, as formed, comprises from 0.1 wt.% to 10 wt % isopropanol, based on the total weight of the denatured ethanol composition.

15. The process as in one of claims 1-14, wherein the separating comprises:
separating a first portion of the crude ethanol product into an ethanol stream and the one or more derivative streams;
purifying the ethanol stream to form a purified ethanol stream; and
combining a second portion of the crude ethanol product with the purified ethanol stream to form the denatured ethanol composition.

16. The process as in one of claims 1-15, wherein the separating comprises:
separating at least a portion of the crude ethanol product into an ethanol stream and the one or more derivative stream;
purifying the ethanol stream to form a purified ethanol stream; and
combining at least a portion of the acetic acid feed with the purified ethanol stream to form the denatured ethanol composition.

17. The process as in one of claims 1-16, further comprising:
separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol, acetaldehyde, and ethyl acetate, and a first residue comprising acetic acid.

18. The process as in one of claims 1-17, further comprising:
separating at least a portion of the first distillate into an ethanol stream and a denaturant stream comprising acetaldehyde and ethyl acetate;
purifying the ethanol stream to form a purified ethanol stream; and
combining at least a portion of the denaturant stream and the purified ethanol stream to form the denatured ethanol composition.

19. The process as in one of claims 1-17, further comprising:
separating at least a portion of the first distillate into an ethanol stream;
purifying the ethanol stream to form a purified ethanol stream; and combining at least a portion of the first residue and the purified ethanol stream to form
the denatured ethanol composition.

20. The process as in one of claims 1-17, further comprising:
separating, in a second column, at least a portion of the first distillate into a second distillate comprising ethyl acetate and/or acetaldehyde, and an ethanol stream;
purifying the ethanol stream to form a purified ethanol stream; and
combining at least a portion of the second distillate and the purified ethanol stream to form the denatured ethanol composition.

21. The process of claim 20, wherein the second column is an extractive distillation column.

22. The process as in one of claims 1-17, further comprising:
separating, in a second column, at least a portion of the first distillate into a second residue comprising ethyl acetate, and an ethanol stream;
purifying the ethanol stream to form a purified ethanol stream; and
combining at least a portion of the second residue and the purified ethanol stream to form the denatured ethanol composition.

23. The process of claim 22, wherein the second column is a non-extractive distillation column.

24. The process as in one of claims 1-17, further comprising:
separating, in a second column, at least a portion of the first distillate into a second residue comprising ethyl acetate, and an ethanol stream;
separating, in a third column, at least a portion of the second residue into a third distillate comprising ethyl acetate and ethanol.

25. The process as in one of claims 1-24, wherein the denaturant comprises ethyl acetate, and wherein the denatured ethanol composition further comprises:
from 0.01 wt.% to 40 wt.% ethyl acetate;
from 50 wt.% to 99 wt.% ethanol; and
from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

26. The process as in one of claims 1-24, wherein the denaturant comprises acetaldehyde, and wherein the denatured ethanol composition further comprises:
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 50 wt.% to 99 wt.% ethanol; and
from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

27. The process as in one of claims 1-24, wherein the denaturant comprises isopropanol, and wherein the denatured ethanol composition further comprises:
from 0.1 wt.% to 10 wt.% isopropanol;
from 50 wt.% to 99 wt.% ethanol; and
from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

28. The process as in one of claims 1-24, wherein the denaturant comprises diethyl ether, and wherein the denatured ethanol composition further comprises:
from 0.1 wt.% to 20 wt.% diethyl ether;
from 50 wt.% to 99 wt.% ethanol; and
from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

29. The process as in one of claims 1-24, wherein the denaturant comprises acetic acid, and wherein the denatured ethanol composition further comprises:
from 0.01 wt.% to 20 wt.% acetic acid
from 50 wt.% to 99 wt.% ethanol; and
from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

30. The process as in one of claims 1-24, wherein the denaturant comprises n-propanol, and wherein the denatured ethanol composition further comprises:
from 0.1 wt.% to 10 wt.% n-propanol
from 50 wt.% to 99 wt.% ethanol; and
from 1 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

31. A denatured ethanol composition formed by the process as in one of claims 1-30.

32. A fuel composition comprising the denatured ethanol composition of claim 31.

33. A feed stock for ester production comprising the denatured ethanol composition of claim 31.

34. A solvent comprising the denatured ethanol composition of claim 31.

35. The process as in one of claims 1-30, wherein the separating step comprises separating the crude ethanol product into an ethanol stream and one or more derivative streams comprising denaturant; further purifying the ethanol stream to form a purified ethanol stream; and
combining at least a portion of the one or more derivative streams with the purified ethanol stream to produce the denatured ethanol composition.

36. The process of claim 35, wherein the denatured ethanol composition comprises from 50 to 99 wt.% ethanol, and from 0.01 to 40 wt.% denaturant.

37. The process of claim 35, wherein the crude ethanol product comprises
from 5 wt.% to 70 wt.% ethanol;
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 0.01 wt.% to 10 wt.% isopropanol;
from 0.01 wt.% to 20 wt.% diethyl ether;
from 0.01 wt.% to 20 wt.% ethyl acetate;
from 0 wt.% to 90 wt.% acetic acid; and
from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

38. The process as in one of claims 35-37, wherein the denaturant is selected from the group consisting of acetaldehyde, acetaldol, ethyl ether, ethyl acetate, and methanol.

39. The process as in one of claims 35-38, wherein the denaturant is ethyl acetate.

40. The process as in one of claims 35-39, further comprising
separating, in a first column, at least a portion of the crude ethanol product into a first distillate comprising ethanol and denaturant, and a first residue comprising acetic acid;
separating, in a second column, at least a portion of the first distillate into a second distillate comprising denaturant and a second residue comprising the ethanol stream; and
separating, in a third column, at least a portion of the ethanol stream into a third distillate comprising the purified ethanol stream and a third residue comprising water.

41. The process of claim 40, further comprising adding at least a portion of the second distillate to at least a portion of the purified ethanol stream to produce the denatured ethanol composition.

42. The process as in one of claims 1-30 and 35-41, wherein the acetic acid feed further comprises acetone;
the crude ethanol product further comprises isopropanol; and
the denatured ethanol composition comprises from 0.1 wt% to 10 wt% isopropanol based on the total weight of the denatured ethanol composition.

43. The process of claim 42, wherein the crude ethanol product comprises
from 5 wt.% to 70 wt.% ethanol;
from 0.01 wt.% to 10 wt.% acetaldehyde;
from 0.01 wt.% to 10 wt.% isopropanol;
from 0 wt.% to 20 wt.% ethyl acetate; and
from 5 wt.% to 35 wt.% water, based on the total weight of the crude ethanol product.

44. A denatured ethanol composition formed by the process as in one of claims 35-43.

45. The process as in one of claims 1-3, wherein the hydrogenation is conducted in the vapor phase.

46. The process as in one of claims 1-3, wherein the denaturant is present in an amount less than the azeotropic amount.