In re Application of: MICHAEL D. HARRISON ET AL.  
Serial No.: 11/339,306  
Filed: January 25, 2006  
For: PROCESS FOR PRODUCING SACCHARIDE OLIGOMERS  
Confirmation No.: 7547  
Group Art Unit: 1657  
Examiner: Herbert J. Lilling  
Attorney Docket: 2027.707000/RFE (2007070)  
CUSTOMER NO. 79138

RESPONSE TO FINAL OFFICE ACTION DATED DECEMBER 2, 2008

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicants respectfully request that the following amendments be entered in the captioned patent application in accordance with 37 C.F.R. § 1.116. Applicants submit the foregoing amendments to place the case in even better condition for allowance or appeal.

This paper is submitted in response to the final Office Action dated December 2, 2008, for which the three-month date for response is March 2, 2009.
It is believed that no fee is due; however, should any fees under 37 C.F.R. §§ 1.16 to 1.21 be required for any reason relating to this document, the Director is authorized to deduct said fees from Williams, Morgan & Amerson, P.C. Deposit Account No. 50-0786/2027.707000RE.

Reconsideration of the application in view of the following amendments and remarks is respectfully requested. A listing of the claims begins on page 3, and remarks begin on page 10.
LISTING OF THE CLAIMS

Claim 1. (Original) A process for preparing saccharide oligomers, comprising:
heating an aqueous feed composition that comprises at least one monosaccharide or linear
saccharide oligomer, and that has a solids concentration of at least about 70% by
weight, to a temperature of at least about 40°C; and
contacting the feed composition with at least one catalyst that accelerates the rate of
cleavage or formation of glucosyl bonds for a time sufficient to cause formation
of non-linear saccharide oligomers, wherein a product composition is produced
that contains a higher concentration of non-linear saccharide oligomers than linear
saccharide oligomers.

Claim 2. (Original) The process of claim 1, wherein the aqueous feed composition
comprises at least one monosaccharide and at least one linear saccharide oligomer.

Claim 3. (Original) The process of claim 1, wherein the aqueous feed composition is a
dextrose syrup, a corn syrup, or a solution of maltodextrin.

Claim 4. (Original) The process of claim 1, wherein at least about 50% by weight on a
dry solids basis of the product composition is slowly digestible.

Claim 5. (Original) The process of claim 1, wherein the feed composition is contacted
with the at least one catalyst for at least about five hours.

Claim 6. (Original) The process of claim 1, wherein the feed composition is contacted
with the at least one catalyst for about 15-100 hours.

Claim 7. (Original) The process of claim 1, wherein the at least one catalyst is an
enzyme that accelerates the rate of cleavage or formation of glucosyl bonds.
Claim 8. (Original) The process of claim 7, wherein the enzyme accelerates the rate of cleavage of alpha 1-2, 1-3, 1-4, or 1-6 glucosyl bonds to form dextrose residues.

Claim 9. (Original) The process of claim 7, wherein the enzyme is a glucoamylase enzyme composition.

Claim 10. (Original) The process of claim 7, wherein the amount of enzyme is about 0.5 – 2.5% by volume of the feed composition.

Claim 11. (Original) The process of claim 7, wherein the feed composition is maintained at about 55 - 75°C during the contacting with the enzyme.

Claim 12. (Original) The process of claim 11, wherein the feed composition is maintained at about 60 - 65°C during the contacting with the enzyme.

Claim 13. (Original) The process of claim 7, wherein the feed composition is contacted with the enzyme for about 20-100 hours prior to inactivation of the enzyme.

Claim 14. (Original) The process of claim 13, wherein the feed composition is contacted with the enzyme for about 50-100 hours prior to inactivation of the enzyme.

Claim 15. (Original) The process of claim 1, wherein the at least one catalyst is an acid.

Claim 16. (Original) The process of claim 15, wherein the acid is hydrochloric acid, sulfuric acid, phosphoric acid, or a combination thereof.

Claim 17. (Original) The process of claim 15, wherein acid is added to the feed composition in an amount sufficient to make the pH of the feed composition no greater than about 4.
Claim 18. (Original) The process of claim 15, wherein acid is added to the feed composition in an amount sufficient to make the pH of the feed composition about 1.0 – 2.5.

Claim 19. (Original) The process of claim 15, wherein the feed composition has a solids concentration of about 70 – 90% and is maintained at a temperature of about 70 - 90°C during the contacting with the acid.

Claim 20. (Original) The process of claim 15, wherein the solids concentration of the feed composition is at least about 80% by weight, the acid is added to the feed composition in an amount sufficient to make the pH of the composition about 1.8, and the feed composition is maintained at a temperature of at least about 80°C for about 4-24 hours after it is contacted with the acid.

Claim 21. (Original) The process of claim 15, wherein the solids concentration of the feed composition is about 90-100% by weight, and the feed composition is maintained at a temperature of at least about 149°C for about 0.1 – 15 minutes after it is contacted with the acid.

Claim 22. (Original) The process of claim 21, wherein the acid comprises a combination of phosphoric and hydrochloric acid.

Claim 23. (Withdrawn) The process of claim 1, further comprising hydrogenating the product composition.

Claim 24. (Withdrawn) The process of claim 23, wherein the hydrogenating decolorizes the product composition but does not substantially change its dextrose equivalence.

Claim 25. (Original) The process of claim 1, wherein the feed composition comprises at least about 75% solids by weight.
Claim 26. (Original) The process of claim 25, wherein the feed composition comprises about 75 - 90% solids by weight.

Claim 27. (Original) The process of claim 1, wherein the product composition comprises non-linear saccharide oligomers having a degree of polymerization of at least three in a concentration of at least about 20% by weight on a dry solids basis.

Claim 28. (Original) The process of claim 27, wherein the product composition comprises non-linear saccharide oligomers having a degree of polymerization of at least three in a concentration of at least about 25% by weight on a dry solids basis.

Claim 29. (Original) The process of claim 28, wherein the product composition comprises non-linear saccharide oligomers having a degree of polymerization of at least three in a concentration of at least about 30% by weight on a dry solids basis.

Claim 30. (Original) The process of claim 29, wherein the product composition comprises non-linear saccharide oligomers having a degree of polymerization of at least three in a concentration of at least about 50% by weight on a dry solids basis.

Claim 31. (Original) The process of claim 1, wherein the concentration of non-linear saccharide oligomers in the product composition is at least twice as high as the concentration of linear saccharide oligomers.

Claim 32. (Original) The process of claim 1, wherein the product composition comprises a minor amount of residual monosaccharides, and wherein the process further comprises removing at least some residual monosaccharides from the product composition by membrane filtration, chromatographic fractionation, or digestion via fermentation.

Claim 33. (Original) The process of claim 1, wherein the at least one catalyst that accelerates the rate of cleavage or formation of glucosyl bonds is enzyme, and the product
composition is subsequently contacted with an acid that accelerates the rate of cleavage or formation of glucosyl bonds.

Claim 34. (Original) The process of claim 1, wherein the at least one catalyst that accelerates the rate of cleavage or formation of glucosyl bonds is acid, and the product composition is subsequently contacted with an enzyme that accelerates the rate of cleavage or formation of glucosyl bonds.

Claim 35. (Withdrawn) The process of claim 1, further comprising hydrolyzing a maltodextrin to form a hydrolyzed saccharide solution and concentrating the hydrolyzed saccharide solution to at least about 70% dry solids to form the feed composition.

Claim 36. (Withdrawn) The process of claim 35, wherein the concentrating and the contacting of the feed composition with the at least one catalyst occur simultaneously.

Claim 37. (Withdrawn) The process of claim 35, wherein the concentrating occurs prior to the contacting of the feed composition with the at least one catalyst.

Claim 38. (Withdrawn) A carbohydrate composition, comprising a major amount on a dry solids basis of linear and non-linear saccharide oligomers, wherein the concentration of non-linear saccharide oligomers is greater than the concentration of linear saccharide oligomers.

Claim 39. (Withdrawn) The composition of claim 38, wherein the concentration of non-linear saccharide oligomers in the composition is at least twice as high as the concentration of linear saccharide oligomers.

Claim 40. (Withdrawn) The composition of claim 38, wherein the concentration of non-linear saccharide oligomers having a degree of polymerization of at least three is at least about 20% by weight on a dry solids basis.
Claim 41. (Withdrawn) The composition of claim 40, wherein the concentration of non-linear saccharide oligomers having a degree of polymerization of at least three is at least about 25% by weight on a dry solids basis.

Claim 42. (Withdrawn) The composition of claim 41, wherein the concentration of non-linear saccharide oligomers having a degree of polymerization of at least three is at least about 30% by weight on a dry solids basis.

Claim 43. (Withdrawn) The composition of claim 42, wherein the concentration of non-linear saccharide oligomers having a degree of polymerization of at least three is at least about 50% by weight on a dry solids basis.

Claim 44. (Withdrawn) The composition of claim 38, wherein the concentration of non-linear saccharide oligomers is at least about 90% by weight on a dry solids basis, and the concentration of isomaltose is at least about 70% by weight on a dry solids basis.

Claim 45. (Withdrawn) A food product, comprising a carbohydrate composition that comprises a major amount on a dry solids basis of linear and non-linear saccharide oligomers, wherein the concentration of non-linear saccharide oligomers is greater than the concentration of linear saccharide oligomers.

Claim 46. (Withdrawn) The food product of claim 45, wherein the food product is a bread, cake, cookie, cracker, extruded snack, soup, frozen dessert, fried food, pasta product, potato product, rice product, corn product, wheat product, dairy product, yogurt, confectionary, hard candy, nutritional bar, breakfast cereal, or beverage.

Claim 47. (Withdrawn) The food product of claim 45, wherein the concentration of non-linear saccharide oligomers having a degree of polymerization of at least three in the carbohydrate composition is at least about 25% by weight on a dry solids basis.
Claim 48. (Withdrawn) The food product of claim 45, wherein the concentration of non-linear saccharide oligomers having a degree of polymerization of at least three in the carbohydrate composition is at least about 50% by weight on a dry solids basis.
REMARKS

1. Status of claims

Claims 1-48 are pending, of which claims 23-24 and 35-48 have been withdrawn from consideration as being directed to non-elected inventions. Claims 1-22 and 25-34 are under consideration.

2. Claim rejections under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-22 and 25-34 as allegedly being obvious over Bengs, et al., US 6,696,563 ("Bengs"), alone or in view of Dreese, et al., US 5,376,399 ("Dreese"). Applicants traverse these rejections.

According to MPEP 2142, to reach a proper determination of obviousness under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person (emphasis added). Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention (emphasis added). The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.
Guidance in following the process of determining the obviousness of a claim has been provided by recent United States case law, specifically, *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In *KSR*, the Supreme Court indicated that, regardless of the particular rationale used, a finding of unpatentability under 35 U.S.C. § 103(a) requires an Examiner to show, among other findings, both (i) a finding that the person of ordinary skill in the art had *an apparent reason* to combine known options or known elements and (ii), if an apparent reason exists, a finding that the person of ordinary skill in the art could have pursued a combination *with a reasonable expectation of success*. The apparent reason that must be found under (i) may emerge from interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, considering the inferences and creative steps a person of ordinary skill would employ.

As should be apparent, the apparent reason and reasonable expectation of success require known options or known elements; options or elements not known in the art cannot be combined.

Claim 1 and all claims dependent thereon recite a process for preparing saccharide oligomers, comprising heating an aqueous feed composition that comprises at least one monosaccharide or linear saccharide oligomer, and that has a solids concentration of at least about 70% by weight, to a temperature of at least about 40°C; and contacting the feed composition with at least one catalyst that accelerates the rate of cleavage or formation of glucosyl bonds for a time sufficient to cause formation of non-linear saccharide oligomers, wherein a product composition is produced that contains a higher concentration of non-linear saccharide oligomers than linear saccharide oligomers.
Bengs is directed to \(\alpha\)-amylase resistant polysaccharides having a degree of branching in the 6 position of at most 0.5\% (col. 2, lines 61-63). The \(\alpha\)-amylase resistant polysaccharides are produced starting from water-insoluble poly(1,4-\(\alpha\)-D-glucans) (col. 3, line 12 to col. 5, line 9). The water-insoluble poly(1,4-\(\alpha\)-D-glucans) have a degree of branching in the 6 position of at most 0.5\% (col. 5, lines 51-54). Specifically, "\(\alpha\)-1,6-glycosidic bonds cannot be detected in poly(1,4-\(\alpha\)-D-glucans)] by \(^{13}\)C-NMR" (col. 5, lines 24-27).

For the person of ordinary skill in the art to find the claims obvious over either Bengs alone or Bengs in view of Dreese, he or she would have to have an apparent reason to modify the teachings of Bengs or Bengs in view of Dreese to arrive at the present invention with a reasonable expectation of success. Applicants submit the person of ordinary skill in the art would lack an apparent reason to modify the teachings of Bengs or Bengs in view of Dreese to arrive at the present invention. Applicants also submit that, considered strictly for the sake of argument, if such an apparent reason existed, the person of ordinary skill in the art would lack a reasonable expectation of success to arrive at the present invention. Applicants' reasoning for these points is set forth below.

If the person of ordinary skill in the art were considering the problem of producing a saccharide oligomer product composition that contains a higher concentration of non-linear saccharide oligomers than linear saccharide oligomers, he or she would note that Bengs teaches a process starting with poly(1,4-\(\alpha\)-D-glucans) have a degree of branching in the 6 position of at most 0.5\%, and preferably having an undetectable amount of \(\alpha\)-1,6-glycosidic bonds, i.e., a degree of branching in the 6 position that is too small to be detected. From these teachings of Bengs, the person of ordinary skill in the art would conclude Bengs teaches starting with a
composition comprising essentially all monosaccharides or linear saccharides and comprising essentially no non-linear saccharides.

The person of ordinary skill in the art would then note that Bengs teaches generating α-amylase resistant polysaccharides by processes involving starting with a suspension or dispersion of the poly(1,4-α-D-glucans) discussed above, followed by cooling alone or heating and cooling, with the cooled product then retrograded and, if necessary, dried (col. 3, line 12 to col. 5, line 9). The person of ordinary skill in the art would expect these process steps to generate very few, if any, α-1,6-glycosidic bonds. This expectation is consistent with the explicit teaching of Bengs that its α-amylase resistant polysaccharides having a degree of branching in the 6 position of at most 0.5%. From either or both of these points, the person of ordinary skill in the art would conclude Bengs teaches generating α-amylase resistant polysaccharides comprising essentially all monosaccharides or linear saccharides and comprising essentially no non-linear saccharides.

Compositions containing at least as many non-linear saccharides as linear saccharides are not taught by Bengs, and therefore qualify as unknown options or unknown elements. Therefore, as a matter of logic, Bengs provides no apparent reason to modify its teachings to arrive at a method to generate a composition containing at least as many non-linear saccharides as linear saccharides, such as that recited by the present claims. Bengs teaches that its process generates a product that can have a resistant starch (RS) content up to at least 75% by weight or even at least 95% by weight (col. 2, lines 42-44). The person of ordinary skill in the art would find this RS content to be very high and would see no reason to modify the process of Bengs, especially given that from the teachings of Bengs, any modifications not taught by Bengs are unknown options or unknown elements.
In light of the above discussion, if the person of ordinary skill in the art then turned to Dreese, he or she would find Dreese is directed to starches useful as fat substitutes in confectionary cremes. This use is different from the problem of producing resistant starches to which Bengs is directed. The person of ordinary skill in the art would therefore have no reason to give Dreese further consideration. Even if, considered strictly for the sake of argument, the person of ordinary skill in the art considered Dreese further, he or she would find Dreese teaches the inclusion of saccharide syrups in the cremes, but \textit{fails} to teach techniques of forming saccharide syrups or saccharide syrups containing at least as many non-linear saccharides as linear saccharides (col. 12, line 10 to col. 13, line 23). Dreese's teaching of a saccharide syrup at 50-85\% dry solids in a product suggests to the person of ordinary skill in the art that the final product of Bengs \textit{might} be concentrated to such a high concentration, but \textit{fails} to suggest that the starting poly(1,4-\alpha-D-glucans) of Bengs should be concentrated to such a high concentration. Combining the teachings of Dreese with those of Bengs still \textit{fails} to provide the person of ordinary skill in the art with an apparent reason to modify Bengs to arrive at the presently claimed invention.

Therefore, Applicants request this rejection of claims 1-22 and 25-34, either over Bengs alone or Bengs in view of Dreese, be withdrawn.
3. Conclusion

Applicants submit all pending claims are in condition for allowance. The Examiner is invited to contact the undersigned patent agent at (713) 934-4065 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

WILLIAMS, MORGAN & AMERSON, P.C.
CUSTOMER NO. 79138

January 29, 2009

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<td><strong>First Named Inventor/Applicant Name:</strong></td>
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