

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WISCONSIN

U.S. WATER SERVICES, INC.
and ROY JOHNSON,

Plaintiffs,

v.

OPINION & ORDER
13-cv-864-jdp

NOVOZYMES A/S and
NOVOZYMES NORTH AMERICA, INC.,

Defendants.

Plaintiffs U.S. Water Services, Inc. and Roy Johnson sued defendants Novozymes A/S and Novozymes North America, Inc. for infringing U.S. Patents Nos. 8,415,137 and 8,609,399, two patents that disclose methods for using the enzyme phytase to reduce phytic acid deposits on equipment used in fuel ethanol production. (Consistent with its practice throughout this lawsuit, the court will refer to plaintiffs as “U.S. Water” and defendants as “Novozymes.”) A jury found in U.S. Water’s favor on all asserted claims, Dkt. 800, and awarded approximately \$7.5 million in damages, Dkt. 812. The court entered judgment on the verdict a few days later. Dkt. 831.

Both sides have filed post-trial motions. U.S. Water seeks a permanent injunction, an “enhanced royalty,” supplemental damages, prejudgment interest, and post-judgment interest. Dkt. 839 and Dkt. 843. Novozymes seeks judgment as a matter of law on infringement, invalidity, and damages, and, in the alternative, seeks a new trial. Dkt. 846; Dkt. 847; Dkt. 849. Novozymes has also filed a motion to strike one of U.S. Water’s reply briefs and to seal some of its filings. Dkt. 848 and Dkt. 892. The court will grant the motion to seal.

As for the remaining motions, it is only necessary to consider one of them, which is Novozymes's motion for judgment as a matter of law on the ground that the asserted claims are invalid. The court rejects Novozymes's arguments regarding obviousness, but the court concludes that the jury's verdict that the patents-in-suit are not anticipated by the Veit patent application is not supported by a reasonable view of the evidence. U.S. Water adduced evidence at trial that the addition of phytase to ethanol processing fluid would not necessarily reduce deposits under all possible conditions. But the trial evidence showed the addition of phytase *under conditions disclosed in Veit* would hydrolyze all the available phytic acid so that there would be no phytic acid available to form deposits. Thus, although Veit says nothing about reducing deposits, deposit reduction is an inherent result of the use of phytase as disclosed in Veit. Because the conditions disclosed in Veit satisfy all the elements of the asserted claims, those claims are anticipated. The court will grant Novozymes's motion and enter judgment in Novozymes's favor. All other pending motions are moot.

BACKGROUND

The background to this case is set out in detail in this court's summary judgment decision, Dkt. 561, and the Court of Appeals decision, *U.S. Water Servs., Inc. v. Novozymes A/S*, 843 F.3d 1345 (Fed. Cir. 2016), so there is no need to repeat it in detail here.

The '137 patent and the '399 patent share a common specification and disclose methods for using an enzyme called phytase to reduce the formation of deposits of phytic acid and phytates (metallic salts of phytic acid) during ethanol production. Fouling by such deposits impedes heat transfer and fluid flow, thus decreasing the efficiency of ethanol processing equipment. Historical solutions to the fouling problem include physical cleaning of the

equipment and reducing the pH of the processing fluid by adding sulfuric acid. The enzyme phytase hydrolyzes (which is to say breaks down) phytic acid and its salts, and the resulting components are soluble in the processing fluid and do not form deposits.

U.S. Water sells a phytase-based product called pHytOUT to reduce phytate fouling on fuel ethanol production equipment. Novozymes sells a competing phytase-based product called Phytaflow, which is the accused product in the case.

U.S. Water asserts claims 1, 6, and 12 of the '137 patent and claims 1, 2, 5, 7-9, 16, and 18-20 of the '399 patent. Claim 1 of the '137 patent is an illustrative independent claim:

I. A method of reducing formation of insoluble deposits of phytic acid or salts of phytic acid on surfaces in a fuel ethanol-processing equipment, the method comprising:

adding phytase to an ethanol processing fluid in the equipment containing phytic acid or salts of phytic acid under conditions suitable for converting the insoluble phytic acid or phytic acid salts to soluble products;

thereby reducing the formation of deposits of insoluble phytic acid or phytic acid salts on surfaces in the equipment;

wherein the equipment in which deposit formation is reduced comprises a beer column, and wherein the pH of the ethanol processing fluid in the beer column is 4.5 or higher during production of ethanol.

'137 patent, 12:30-42. The asserted claims include various combinations of seven elements.

At summary judgment, this court held that the patents-in-suit were anticipated by two pieces of prior art: World Intellectual Property Organization application, No. WO 01/62947 for "Fermentation with a Phytase," to Chris Veit and others; and United States Patent No. 5,756,714, for "Method for Liquefying Starch," to Richard L. Antrim and others. There was no genuine dispute that Veit and Antrim expressly disclosed six of the seven elements of the

asserted claims, and there was no dispute that neither of them expressly mentioned the benefit of deposit reduction.

Novozymes contended that both Veit and Antrim inherently disclosed deposit reduction because, in the view of Novozymes's experts, deposit reduction was an inevitable consequence of using phytase as disclosed in the two references. U.S. Water's experts disagreed that deposit reduction would inevitably result. This court deemed the dispute between the experts to be immaterial and granted summary judgment to Novozymes.

The court of appeals disagreed, concluding that there was a genuine issue of material fact concerning inherent disclosure because, at summary judgment, U.S. Water's experts "testified that there are numerous factors affecting the ultimate reduction of insoluble organometallic salt deposits." *U.S. Water Servs., Inc. v. Novozymes A/S*, 843 F.3d 1345, 1351–52 (Fed. Cir. 2016). The case went to trial, and the jury found that the patents-in-suit were infringed and not invalid.

ANALYSIS

A. Anticipation

The question now before the court is, once again, whether Veit inherently discloses the benefit of deposit reduction when phytase is used under circumstances claimed in the patents-in-suit. (Novozymes does not press its argument based on Antrim in its post-verdict motion.) But this time, the court reviews the trial record, not the summary judgment record. The applicable standards are those of the regional circuit. *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 841 (Fed. Cir. 2010), *aff'd*, 564 U.S. 91 (2011). Under Seventh Circuit precedent, the court must construe the evidence strictly in favor of the prevailing party, here U.S. Water, and

the jury's verdict must be affirmed if any reasonable view of the evidence supports it. *Passananti v. Cook Cty.*, 689 F.3d 655, 659 (7th Cir. 2012). Novozymes, as the accused infringer, bears the initial burden of going forward with evidence to support its allegation of invalidity. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1364 (Fed. Cir. 2018). Once that evidence is presented, U.S. Water, as the patentee, has the burden to present contrary evidence to rebut it. *Id.*

“Under 35 U.S.C. § 102[,] a claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference.” *King Pharm., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010) (internal citations and quotation marks omitted). Before trial, the court determined as a matter of law that Veit discloses all but one of the limitations of the asserted claims: reducing the formation of insoluble deposits of phytic acid or salts of phytic acid. Dkt. 728, at 23–24. This was an aspect of the court's summary judgment decision that was not challenged on appeal, so it is law of the case now. The parties agree, and the trial evidence shows, that Veit teaches using phytase to improve fermentation, but that, expressly, it says nothing about deposit reduction.

Nevertheless, Novozymes contends that the trial evidence supports only one reasonable conclusion: that Veit inherently discloses deposit reduction. A reference inherently discloses a claim element if the unstated element necessarily results from the practice of the express disclosure in the prior art reference. *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1376 (Fed. Cir. 2005). It does not matter if one of skill in the art or the source of the prior art recognizes the inherent, but unstated, characteristic of the prior art. *Id.* But the unstated element must flow inevitably from the expressly disclosed aspects of the prior art. If there are other factors that would affect the outcome of the expressly disclosed method, so that the

putative inherent element does not always result, then the prior art does not inherently disclose that element.

U.S. Water contends that this issue has already been resolved by the court of appeals. U.S. Water argues that because the court of appeals held that there was a genuine dispute of material fact about whether Veit inherently disclosed deposit reduction, and the jury found the patents-in-suit not anticipated, the matter has been conclusively resolved. But that is incorrect. The court of appeals had before it only the summary judgment record, not the trial evidence. The two sets of evidence are not identical: this court excluded some of U.S. Water's expert testimony on the issue, and Dr. Reed did not testify at trial. The court of appeals cited the conclusions of U.S. Water's experts that certain conditions, particularly the phytase dosage level, must be met for phytate deposit reduction to occur, and that Veit did not specify all these conditions. But this court must now consider whether the conclusions of U.S. Water's experts were supported by the evidence at trial.

It is worth clarifying precisely what must be inherent in Veit. Veit does not expressly teach one how to use phytase to reduce phytate deposits in an ethanol plant. And the evidence at trial showed that Veit does not disclose every condition that might affect the operation of phytase on phytic acid in an ethanol plant. But the pertinent questions are (1) does Veit disclose conditions that necessarily reduce phytate fouling; and (2) do those conditions fall within the scope of the claims of the patents-in-suit? If the answer to these two questions is "yes," then the patents-in-suit claim what was inherently disclosed in Veit.

Novozymes offers two theories of how Veit inherently discloses phytic acid deposit reduction. The first theory is, essentially, that any reduction of phytate will necessarily reduce phytate deposits to some degree. Novozymes contends that under the conditions in which

ethanol is produced, phytase automatically and inevitably hydrolyzes phytic acid. The evidence at trial supports this contention. U.S. Water adduced no evidence to dispute it, and does not dispute it now. So, based on the trial evidence, the jury would have to accept that phytic acid breakdown is an inevitable consequence of introducing phytase to ethanol processing fluid that contained phytic acid. Novozymes contends further that if any phytic acid in the ethanol fluid is hydrolyzed, then there is less phytic acid available to form deposits, and deposits will inevitably be reduced by some amount, however small. The asserted claims, so this argument goes, do not require any particular amount of deposit reduction, so the breakdown of even one molecule of phytic acid will reduce deposits and satisfy this claim element. But the jury was not be required to accept the idea that any reduction of phytic acid would necessarily result in some reduction of deposits.

Eric Dorn, one of U.S. Water's experts, testified that breaking down only some of the phytic acid in the ethanol fluid would not necessarily reduce deposits. He also testified that the ethanol fluid processed in a typical plant in a day would contain between 24 and 36 tons of phytic acid. But, by his calculation, a day's deposits would weigh only about 500 pounds. That would amount to only two percent of the available phytic acid. Dkt. 833, 60:2–63:22. Dorn also testified that he had been at an ethanol plant when the dose of phytase had been inadvertently reduced, and “fouling reduction was essentially eliminated” to the same extent as if no phytase had been used at all. *Id.*, 65:23–66:11. Dorn's ultimate opinion was that, with so much phytase available in the ethanol fluid, and so little required for fouling, one would have to break down “pretty much all of the phytic acid to reduce the fouling.” *Id.*, 67:10-15.

Novozymes contends that Dorn's testimony was inadmissible under the court's pretrial ruling excluding Dorn's “zero order kinetics” theory. (And Novozymes objected to this aspect

of Dorn's testimony during trial.) Dorn had opined that deposits are formed only from the phytic acid that is actually dissolved in the ethanol fluid, which is saturated with phytic acid. But there is an abundance of undissolved phytic acid in suspension. So when some of the dissolved phytic acid is broken down, some of the suspended phytic acid goes into solution to take its place. Consequently, only once all of the suspended phytic acid has moved into solution and is broken down would there be any reduction in deposits. According to Dorn, this process makes the operation of phytase on ethanol fluid akin to a "zero order kinetics" reaction. Before trial, the court excluded Dorn's "zero order kinetics theory" because it was not based on any evidence. Dkt. 726, 47:12-50:12 (Final Pretrial Conference Hearing); Dkt. 728, at 14 (Final Pretrial Conference Order). Dorn's trial testimony did not invoke his zero order kinetic theory, but instead relied on the straightforward observation that breaking down only some of the vast amount of phytic acid in the ethanol fluid would not necessarily reduce deposits. A reasonable jury could have credited Dorn's testimony that breaking down some of the phytic acid in the ethanol fluid would not inevitably result in a corresponding reduction in deposits. So Novozymes's first theory provides no basis to set aside the jury's verdict.

Novozymes's second theory of how Veit inherently discloses a reduction of phytate fouling is more compelling and was not considered by this court or the court of appeals at summary judgment. In Example 1 of his application, Veit disclosed a fermentation test using a dosage of 1 FYT (phytase unit) per gram of dry corn mash in which the phytase hydrolyzed the phytic acid below the detection level. Veit, 12:30-31, 16:30-17:28. The phytase dosage, the pH level, and the temperature used in the Veit test all fall within the ranges claimed in the patents-in-suit. And because the phytic acid had been completely hydrolyzed, there was no

phytic acid or phytate to form deposits. Thus, deposits would necessarily be reduced because there was no phytic acid to form deposits.

U.S. Water's trial evidence did not rebut the evidence that the conditions in Veit's fermentation test would necessarily reduce phytate deposits. In response to Novozymes's post-trial motion, U.S. Water relies primarily on the testimony of Keith Flanagan (who testified at trial in place of Simms, but on the basis of Simms's expert report). Dkt. 859, at 20-25. U.S. Water emphasizes Flanagan's testimony that Veit says nothing about deposit control and does not teach one how to use phytase to reduce deposits. All agree that Veit does not expressly teach a method of deposit control. But it does not matter if the source of the prior art recognizes the inherent result. *Perricone*, 432 F.3d at 1376. So the fact that Veit does not expressly teach deposit reduction, or the fact that Veit himself did not recognize the deposit-reducing benefit of phytase, is immaterial.

U.S. Water says that Flanagan testified that "there are a wide range of phytases, doses, and temperatures that all must work together in order to necessarily reduce deposits." Dkt. 859, at 21. And "Veit discloses vast ranges of phytase doses, phytase enzymes, temperatures, pHs, and addition points, that, when combined, would not necessarily result in deposit reduction." *Id.* at 22. U.S. Water cites as an example that Veit discloses a very broad range of phytate dosage, including at the low end just .0005 FYT, which converts to 1.5 parts per billion of phytase enzyme. U.S. Water is correct that there was no evidence at trial that such a miniscule amount of phytase would reduce deposits. U.S. Water also cites Flanagan's testimony that the presence of ethanol inhibits phytase activity, so that adding phytase during or after fermentation—when ethanol is present—might not as effectively break down phytic acid. U.S.

Water argues from these examples that one could “practice Veit” without necessarily reducing phytate deposits.

But U.S. Water misconstrues basic principles of inherent anticipation. It is well established that “each disclosed embodiment [of a prior art reference] can be the basis for an anticipatory disclosure.” Robert A. Matthews, Jr., 3 Annotated Patent Digest § 17.39 (2018).¹ The same principle applies to cases involving inherent disclosure. For example, in *Leggett & Platt, Inc. v. VUTEk, Inc.*, 537 F.3d 1349 (Fed. Cir. 2008), the court rejected “the erroneous assumption that the disclosure of multiple examples renders one example less anticipatory.” *Id.* at 1356. The bottom line is that the disclosure of one anticipatory example is enough.

So the pertinent question is not whether deposit reduction results from “practicing Veit” as a whole, or whether deposit reduction results from practicing every embodiment disclosed in Veit. Rather, the pertinent question is whether Veit disclosed *any* example that falls within the scope of the asserted claims and that necessarily produces the claimed benefit of reduction of phytate deposits.

¹ See, e.g., *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381–83 (Fed. Cir. 2015) (“[S]ubstantial evidence supports the Board’s conclusion that Grab effectively teaches 15 combinations, of which one anticipates pending claim 1.”); *Krippelz v. Ford Motor Co.*, 667 F.3d 1261, 1268 (Fed. Cir. 2012) (prior art reference anticipated claim even though one embodiment in prior reference did not anticipate); *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1376 (Fed. Cir. 2005) (rejecting “the notion that [a compound] cannot anticipate because it appears without special emphasis in a longer list”); *Seachange Intern., Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1380 (Fed. Cir. 2005) (textual description of anticipatory embodiment could suffice even though nonanticipatory preferred embodiment of prior art reference was pictured in a figure; “[t]he fact that another embodiment is disclosed does not detract from the remainder of the disclosure”); *Arthrocare Corp. v. Smith & Nephew, Inc.*, 406 F.3d 1365, 1372 (Fed. Cir. 2005) (prior art reference anticipated claim; “it was error for the district court to limit the disclosure of the prior art reference to a preferred embodiment”).

Veit's fermentation test using phytase under the specified conditions meets both these conditions. The Veit fermentation test used phytase derived from *Peniophora lycii*, one of the suitable sources of phytase described in the patents-in-suit. Veit, at 12:30-31; '399 patent at 5:63-67. The Veit fermentation test used a dose of 1 FYT per gram of corn mash, which is well within the dosage range claimed in the patents-in-suit. (The different sources express phytase dosage in various units, which were converted and compared by Novozymes's expert. See the court's summary judgment decision, Dkt. 561, at 20.) The temperature during saccharification was 60 degrees centigrade and during fermentation it was 30 degrees centigrade. Both of these temperatures are within the only temperature range claimed in the patents-in-suit. '137 patent, claim 6 (claiming range of 20 to 80 degrees centigrade). The pH level in the Veit test was 4.5, which meets the claimed limitation in the patents-in-suit of 4.5 or higher. '399 patent, claim 35; '137 patent, claim 1. In the Veit test phytase was added during a pre-saccharification step, which is a point in the ethanol production process that is claimed in the patents-in-suit (and a point at which ethanol is not yet present). Novozymes showed that the use of phytase under the conditions used in the Veit fermentation test would necessarily break down all the phytic acid in the ethanol fluid. The section of U.S. Water's opposition brief that addresses this issue, section I.B.4, is only five pages, and U.S. Water points to no trial evidence that rebutted this fact. And U.S. Water's experts conceded at trial that if all the phytic acid were eliminated, phytate fouling could not occur. Dkt. 833, Trial Tr. (Oct. 17, 2017 a.m.), at 74:4-12 (Dorn); 149:7-14 (Flanegan).

The court concludes that Novozymes met its burden to show by clear and convincing evidence and as a matter of law that Veit inherently disclosed using phytase to reduce phytate deposits because Veit's fermentation test expressly disclosed conditions sufficient to break

down all the phytic acid present in the ethanol fluid, thereby preventing phytate fouling. Because the deposit-reduction element was the only element not expressly disclosed in Veit, Novozymes met its burden to show that the patents-in-suit were anticipated by Veit. No reasonable view of the evidence supports the jury's verdict on this point.

B. Obviousness

Novozymes also contends that the patents-in-suit are invalid because they are obvious over the combination of Veit and U.S. Patent No. 4,914,029 ("Caransa"). The gist of Novozymes' argument is that Caransa expressly discloses phytate deposit reduction in ethanol production, and that one of skill in the art would be motivated to combine the two references. Because Caransa fills the missing element in Veit, Novozymes contends that it sustained its burden to show obviousness, and that no reasonable jury could conclude otherwise.

"Obviousness is a question of law based on subsidiary findings of fact." *In re Van Os*, 844 F.3d 1359, 1360 (Fed. Cir. 2017). On a motion for judgment as a matter of law, the court will presume that the jury resolved all factual disputes in favor of the verdict, leaving them undisturbed so long as they are supported by substantial evidence. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1357 (Fed. Cir. 2012). Then the court reviews the ultimate legal conclusion de novo. *Id.*

U.S. Water contends that Caransa does not relate to ethanol production, but to the production of corn steep liquor. Further, U.S. Water contends that Caransa does not teach deposit reduction, but only the elimination of phytate sludge. These arguments are weak. The only reason to produce corn steep liquor is to produce ethanol, and Caransa speaks of both phytate sludge and "precipitate coating." So the court is not persuaded that the combination of Veit and Caransa do not include all the elements of the asserted claims.

Nevertheless, U.S. Water adduced evidence at trial that one of skill in the art would not think to combine Caransa and Veit. U.S. Water's Flanagan testified that because Caransa deals with the wet-milling, it presents a different set of problems from those addressed by the patents-in-suit, which relate to dry-grind plants. The jury did not have to accept Flanagan's view that Caransa was not closely related art, but a reasonable jury could have. The court is not persuaded that any of U.S. Water's other obviousness evidence could not be accepted by a reasonable jury. With the bulk of the factual determinations regarding obviousness left in place, the court concludes that the jury's verdict on obviousness is supported by a reasonable view of the evidence, and there is no basis for overturning the ultimate conclusion that the patents-in-suit are not obvious.

ORDER

IT IS ORDERED that:

1. Defendants' motion to seal, Dkt. 848, is GRANTED.
2. The motion for judgment as a matter of law filed by defendants Novozymes A/S and Novozymes North America, Inc. on the ground that claims 1, 6, and 12 of the '137 patent and claims 1, 2, 5, 7-9, 16, and 18-20 of the '399 patent are invalid as anticipated by prior art, Dkt. 849, is GRANTED.
3. The motion for judgment as a matter of law filed by defendants Novozymes A/S and Novozymes North America, Inc. on the ground that claims 1, 6, and 12 of the '137 patent and claims 1, 2, 5, 7-9, 16, and 18-20 of the '399 patent are invalid as obvious, Dkt. 849, is DENIED.
4. All other pending motions, Dkts. 839, 843, 846, 847, and 892, are DENIED as moot.

5. The clerk of court is directed to enter an amended judgment in defendants' favor.

Entered May 25, 2018.

BY THE COURT:

/s/

JAMES D. PETERSON
District Judge