

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte CHRISTIAN VICTOR,
ALESSIA MERIGGI, and
KARL BOOTEN

Appeal No. 2006-2369
Application No. 10/169,618

ON BRIEF

Before SCHEINER, ADAMS, and GRIMES, Administrative Patent Judges.
GRIMES, Administrative Patent Judge.

DECISION ON APPEAL

This appeal involves claims directed to glucoside alkyl urethane compounds, and methods of preparing them. The examiner has rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 134. We affirm.

Background

“Tensio-active agents are widely used as surfactants in compositions for household and industrial applications The oldest type[s] of tensio-active agents are the alkali soaps of fatty acids.” Specification, page 1.

“In the search for alternative or improved surfactants, also monomeric and dimeric sugars such as glucose and sucrose (saccharose) have been used as starting material for the synthesis of non-ionic derivatives with tensio-active properties.” Id. “The synthesis of several sucrose N-n-alkyl urethanes and their tensio-active properties [has] been disclosed” in the prior art. Id. “The urethanes are prepared by reacting sucrose with the corresponding n-alkyl isocyanate” Id. Although “no mention is made of possible tensio-active properties” of urethane derivatives of polysaccharides in the prior art, a number of references disclose the preparation of urethane derivatives of a variety of polysaccharides. Page 2, lines 16-33.

The specification discloses that urethane derivatives of glucosides possess “tensio-active,” or surfactant, properties. Page 3. Of particular interest are glucoside alkyl urethane derivatives wherein the glucoside is a hydrolysate of the polysaccharide starch. Id.

Starch hydrolysates are prepared by converting starch, a polymer of glucose, into smaller molecules by cleaving the bonds between the glucose monomers. Page 4. The bonds between the glucose monomers can be cleaved by methods including acid hydrolysis, enzymatic hydrolysis, thermal treatment or shearing. Id. “Starch hydrolysates are polydisperse mixtures” composed of individual glucose molecules, oligomeric chains of two to ten covalently joined glucose molecules, and polymeric chains of more than ten glucose monomers. Id. “Starch hydrolysates are well known in the art.” Id.

The term “dextrose equivalent,” or “D.E.,” describes the degree to which the bonds between the glucose subunits of a starch molecule have been cleaved. Page 5.

D.E. “formally corresponds to the grams of D-glucose (dextrose) per 100 grams of dry substance.” Id. Thus, pure glucose (dextrose) by definition has a D.E. of 100. Id. D.E. therefore is “a measurement of the extent of the hydrolysis of the starch and also a relative indication of the average molecular weight of the glucose polymers in the starch hydrolysate.” Id. The specification discloses that, for use in urethane glucoside derivatives, preferred starch hydrolysates have a D.E. ranging from 1 to 47. Page 6.

Urethane derivatives of starch hydrolysates are prepared “by reacting the starch hydrolysate with the selected alkyl isocyanate, or mixture of alkyl isocyanates, in solution with a solvent which is inert with respect to the starch hydrolysate, the isocyanate, and the reaction product.” Page 10.

Discussion

1. Claim construction

Claims 1-7, 9, and 11-33 are on appeal. Appellants argue product claims 1-7, 9, 11-13, and 15-33 separately from process claim 14. See the Appeal Brief, page 5. Appellants state that claims 1-7, 9, 11-13, and 15-33 stand or fall together with respect to the pending rejection, and that claim 14 stands or falls on its own. Id.

With respect to the product claims, we will focus on claim 9, which is representative. Claim 9 reads as follows:

9. Glucoside alkyl urethane (I) which is composed of units of formula (II)



wherein

A represents a glucosyl unit of a starch hydrolysate molecule, the starch hydrolysate having a Dextrose Equivalent (D.E.) ranging from 1 to 47,

(O - CO - NH - R) represents an N-alkyl aminocarbonyloxy group replacing a hydroxyl group of the glucosyl unit A, and wherein R represents a linear or branched, saturated or unsaturated alkyl group containing from 3 to 22 carbon atoms, and

s represents the number of alkyl carbamate groups per glucosyl unit which number is expressed as a degree of substitution (DS) with said DS value ranging from about 0.01 to about 2.0.

Thus, claim 9 is directed to an organic compound comprising a plurality of "units" described by formula (II). Formula (II) requires each unit to be composed of a glucose molecule with an alkyl carbamate group covalently bound to it. The glucose molecule of formula (II) is, in turn, a subunit of a larger glucose polymer produced by starch hydrolysis, the hydrolysate having a D.E. of 1 to 47.

The alkyl portion of the unit described by formula (II) may be linear or branched, saturated or unsaturated, and contains 3 to 22 carbon atoms. Each glucose molecule within the hydrolyzed starch moiety may be substituted with about 0.01 to about 2.0 alkyl groups. Thus, for example, a hydrolyzed starch moiety having 100 glucose subunits may have from about 1 to about 200 alkyl carbamate groups covalently bound to it.

Claim 14, the only process claim, reads as follows (paragraphs, spacing and indentation added):

14. Process for the manufacture of a glucoside alkyl urethane (I) as defined in claim 9, comprising

reacting a starch hydrolysate with a D.E. between 1 and 47, dissolved in a first solvent, with such an amount of alkyl isocyanate that an urethane (I) is yielded having a degree of substitution (DS) ranging from 0.01 to 2.0, the first solvent being inert with respect to the glucoside, the isocyanate and the urethane (I), followed

- (i) by precipitation of the formed urethane (I), optionally after partial removal of the first solvent by evaporation under reduced pressure, either by addition under stirring of a precipitant solvent to the reaction mixture or by slowly pouring under stirring the, optionally concentrated, reaction mixture into a precipitant solvent, followed by isolation of the precipitated urethane (I), treating or washing of the urethane (I) with a precipitant solvent, and drying of the obtained urethane (I), or
- (ii) by spraying the reaction mixture in a stream of CO₂ under about 200 bar, with subsequent isolation, optionally washing with a precipitant solvent, and drying of the obtained urethane (I).

Thus, claim 14 is directed to preparing the product recited in claim 9 by reacting a starch hydrolysate with an alkyl isocyanate compound, in an inert solvent, then recovering the glucoside alkyl urethane product by, e.g., precipitating it, washing it with the precipitant solvent, and drying the product.

2. Obviousness

The examiner has rejected claims 1-7, 9, and 11-33, all of the pending claims, under 35 U.S.C. § 103 on the basis that the claimed subject matter would have been obvious in view of Japanese Patent Document 05-043649 (“Sony ‘649”)¹ and Japanese Patent Document 05-042775 (“Sony ‘775”).²

Sony ‘649 discloses the preparation of polysaccharide urethane derivatives which are suitable for use as components of a “video photographic paper” coating. Sony ‘649, English translation, at [0051]. The examiner cites Sony ‘649 as teaching urethane modified polysaccharides in which the hydroxyl group of the polysaccharide is

¹ Kobayashi et al., JP 05-043649, published February 23, 1993

² Kobayashi et al., JP 05-042775, published February 23, 1993

substituted with an aminocarbonyloxy group. Answer, page 3. The examiner notes that Sony '649 states that starch hydrolysates are suitable polysaccharides. Id.

The examiner argues that the D.E. values recited in the claims are either inherent in the disclosed hydrolyzed starting materials, which contain di-, tri-, tetra- and oligosaccharides or would have been obvious "in view of the explicit disclosure that substantially hydrolyzed starches and other polysaccharides are suitable for the invention." Id.

The examiner also argues that the DS values recited in the claims are disclosed by Sony '649. See the Examiner's Answer, page 4: Sony '649 "explicitly discloses that the molar ratio of NCO groups per hydroxyl groups can be anywhere between 1:0.5 to 1:10. Using [the] lower ratio of cyano groups in the reaction would inherently result [in] the claimed degree of hydroxyl group substitution."

The examiner acknowledges that the compounds in Sony '649 have cyclic or aromatic substituents, not the alkyl substituents recited in the claims, but cites Sony '775 for this limitation. Id. Sony '775 discloses the preparation of polysaccharide urethane derivatives for use in "video photographic paper." Sony '775, English translation, abstract; see also [0001]. The examiner concludes that it would have been obvious to substitute octyl isocyanate for the cyclohexyl isocyanate taught by Sony '649 because Sony '775 teaches that both compounds are appropriate for making urethane derivatives to use in photographic paper. Examiner's Answer, page 4.

Regarding the claimed process, the examiner indicates that the steps in the illustrative examples of Sony '649 "fully correspond[] to the steps of claim 14. Modification and substitution of the reactants in the process disclosed in Sony '649

would have been obvious as per discussion above.” Id. Thus, the examiner urges that substituting the reactants recited in Appellants’ claim 14 for those used in the examples of Sony ‘649 would have been obvious in view of the disclosures of Sony ‘649 and Sony ‘775 that the claimed reactants were suitable in the preparation of urethane derivatives of saccharides. Id.

As stated in In re Oetiker, 977 F.2d 1443, 1445-1446, 24 USPQ2d 1443, 1444-1445 (Fed. Cir. 1992):

[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant.

[T]he conclusion of obviousness vel non is based on the preponderance of evidence and argument in the record.

With respect to claims reciting chemical compounds, “structural similarity between claimed and prior art subject matter, proved by combining references or otherwise, where the prior art gives reason or motivation to make the claimed compositions, creates a prima facie case of obviousness.” In re Dillon, 919 F.2d 688, 692, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990) (en banc). “Structural relationships often provide the requisite motivation to modify known compounds to obtain new compounds.” In re Mayne, 104 F.3d 1339, 1343, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997).

We agree with the examiner that Sony ‘649 and ‘775, taken together, render the claims prima facie obvious. Sony ‘649 discloses the preparation of polysaccharide urethane derivatives which are suitable for use in a “video photographic paper” coating. Paragraph [0051]. Sony ‘649 discloses that a starch hydrolysate composed of

disaccharides, trisaccharides, tetrasaccharides and oligosaccharides is useful as the polysaccharide portion of the compound, and that hydrolysates having higher molecular weight oligosaccharides of seven or more monomers are “especially” preferred. See [0007]:

[A]s the polysaccharide used as a raw material in this invention -- disaccharide and trisaccharide -- tetrasaccharide . . . including oligosaccharide, all the carbohydrates that produce the monosaccharide more than dyad by hydrolysis are usable, and the high molecular compound (what the monosaccharide of seven or more molecules usually condensed) . . . especially is suitable. If such polysaccharide is illustrated concretely, a cellulose, a pullulan, starch, etc. will be mentioned. (Emphases added.)

This disclosure in Sony '649 suggests the claimed D.E. range of 1 to 47.

Appellants' specification, at pages 4-5, explains in detail the relationship between starch hydrolysates and D.E.:

D-glucose (dextrose) presents strong reducing power. Starch hydrolysates are polydisperse mixtures . . . composed of D-glucosyl chains, which also present reducing power resulting from the presence of D-glucose and reducing sugar units (which are essentially terminal glucosyl units) on the oligomeric and polymeric molecules.

A result thereof is that, starting from a given starch product, the more the hydrolysis has proceeded, . . . the higher the reducing powder [sic] of the obtained starch hydrolysate. . . . The reducing power is expressed as dextrose equivalents (D.E.) which formally corresponds to the grams of D-glucose (dextrose) per 100 grams of dry substance. D-glucose having per definition a D.E. of 100, the D.E. indicates the amount of D-glucose and reducing sugar units . . . in a given product Thus the D.E. is in fact also a measurement of the extent of the hydrolysis of the starch and also a relative indication of the average molecular weight of the glucose polymers in the starch hydrolysate.

Thus, as we understand it, a nominally hydrolyzed starch-containing solution would have a D.E. of 1, a totally hydrolyzed starch preparation containing only glucose would have a D.E. of 100, and a solution of maltose (a disaccharide composed two

glucose subunits) would have a D.E. of about 50. The claimed D.E. value of 1 to 47 therefore encompasses starch hydrolysates that are nominally hydrolyzed (D.E. = 1), as well as hydrolysates composed of molecules only slightly larger than a disaccharide (D.E. = 47).

Therefore, we agree with the examiner that the disclosure in Sony '649, paragraph [0007], of the suitability of hydrolysates wherein "starch . . . will be mentioned" as the polysaccharide, and wherein suitable hydrolysates contain "trisaccharide [or] . . . tetrasaccharide," with hydrolysates of "seven or more molecules condensed" being "especially . . . suitable" (emphasis added), suggests the use of a starch hydrolysate having a D.E. of 1 to 47. This is especially true given Appellants' concession that starch hydrolysates "are well known in the art" (specification, page 4), and that starch hydrolysates within the claimed range were commercially available in the prior art (specification, page 8). Sony '649's preference for hydrolysates would have led the skilled artisan to use commercially available starch hydrolysate products as the polysaccharide portion of Sony '649's urethane derivatives. Thus, in our view, Sony '649 suggests the use of a starch hydrolysate having the claimed D.E. as the carbohydrate moiety in the polysaccharide urethane derivatives disclosed in that reference.

The evidence of record also supports the examiner's assertion that Sony '649 and '775 taken together suggest that a linear or branched alkyl-containing isocyanate would have been suitable in the production of polysaccharide urethane derivatives. Sony '649 at paragraph [0009] teaches that four isocyanate compounds -- phenyl isocyanate, m-tolyl isocyanate, p-tolyl isocyanate and cyclohexyl isocyanate -- can be

combined with the polysaccharide moiety to produce polysaccharide urethane derivatives useful in video photographic paper. As acknowledged by the examiner (Answer, page 4), Sony '649 discloses the use of a cyclic alkyl-containing isocyanate, cyclohexyl isocyanate, see [0009], but does not teach the linear or branched alkyl-containing isocyanate recited in claim 9.

However, Sony '775 lists a linear alkyl isocyanate, octyl isocyanate, alongside cyclohexyl isocyanate as an isocyanate compound useful in the preparation of polysaccharide urethane derivatives having utility in video photographic paper coatings. Sony '775, at [0012]. One of ordinary skill would therefore have recognized from Sony '775 that octyl isocyanate would have functioned equivalently to cyclohexyl isocyanate as the isocyanate moiety in polysaccharide urethane derivatives having utility in coatings for video photographic paper.

Based on this recognized equivalence, one of ordinary skill would have further recognized the suitability of Sony '775's octyl isocyanate in the hydrolysate-based urethane derivatives disclosed by Sony '649, and would therefore have been motivated to have used the octyl isocyanate of Sony '775 as the isocyanate moiety in Sony '649's hydrolysate-based urethane derivatives. As noted above, "[s]tructural relationships often provide the requisite motivation to modify known compounds to obtain new compounds." In re Mayne, 104 F.3d at 1343, 41 USPQ2d at 1454 (holding fusion proteins obvious based on the substitution of equivalent amino acids). See also In re Fout, 675 F.2d 297, 301, 213 USPQ 532, 536 (CCPA 1982) ("Express suggestion to substitute one equivalent for another need not be present to render such substitution obvious."). Because claim 9 recites the use of an isocyanate moiety recognized by

Sony '775 as being equivalent to the isocyanates used in Sony '649 for the same purpose, we agree with the examiner that the isocyanate moiety recited in claim 9 would have been obvious to one of ordinary skill at the time the invention was made.

Finally, we agree with the examiner that the references disclose urethane derivatives with a degree of substitution (DS) between 0.01 and 2.0 alkyl carbamate groups per glucosyl unit. Sony '649 teaches that the molar ratio of isocyanate compound to hydroxyl groups in the polysaccharide is preferably 1:1 to 1:3. Paragraph [0010]. The alkyl carbamate groups recited in claim 9 result from reacting an isocyanate with a hydroxyl. We take official notice that each glucose residue in a glucose-based polymer has three hydroxyl groups. Thus, Sony '649's preferred ratio corresponds to a carbamate:glucosyl unit ratio of 3:1 to 1:1, or a degree of substitution between 1.0 and 3.0. Sony '649 therefore suggests DS values that overlap those in the claims.

We also agree with the examiner that Sony '649 and Sony '775 render claim 14 obvious. Looking to the illustrative examples, as urged by the examiner, Example 1 in Sony '649 prepares a polysaccharide urethane derivative by first immersing the polysaccharide in dimethylformamide. Sony '649, at [0017]. The isocyanate compound is then added dropwise to the polysaccharide-containing dimethylformamide solution. Id., at [0018] ("Phenyl isocyanate . . . was dropped from the dropping funnel."). The polysaccharide urethane derivative produced by reacting the polysaccharide and isocyanate is isolated by precipitation while stirring. Id., at [0020] ("After cooling contents . . . to a room temperature, it was dropped into the methanol stirred violently (gradually), and white powder-like settlings were obtained."). The precipitated

polysaccharide urethane derivative is then washed in the precipitating solvent and dried.

Id., at [0020] (“After carrying out settlings . . . the . . . methanol washed them several times and they carried out reduced pressure drying . . .”).

Thus, Example 1 of Sony ‘649 discloses making a polysaccharide urethane derivative by (1) reacting a polysaccharide with an isocyanate in the presence of an inert solvent, (2) precipitating the product by adding the reaction medium to a precipitating solvent (methanol) under stirring; (3) isolating and washing the precipitated product with additional precipitating solvent; and (4) drying the product. Example 1 of Sony ‘649 differs from claim 14 only in that claim 14 recites the use of a starch hydrolysate as the polysaccharide moiety, and an isocyanate having a linear or branched alkyl group as the isocyanate moiety.

However, as discussed supra, Sony ‘649 discloses, at paragraph [0007], that starch hydrolysates are useful in the preparation of the disclosed polysaccharide urethane derivatives, and that hydrolysates of relatively high molecular weights are “especially . . . suitable.” Moreover, as also discussed supra, Sony ‘775, at [0012] discloses that the linear isocyanate octyl isocyanate is useful in preparing polysaccharide urethane derivatives having utility in coatings for video photographic paper. Therefore, in our view, by following the teachings of Sony ‘649 and ‘775, one of ordinary skill would have recognized that the claimed ingredients would have been useful to prepare the claimed compound using the claimed sequence of process steps. We therefore agree with the examiner that one of ordinary skill in the art would have considered process claim 14 obvious.

Appellants argue that the rejection of product claims 1-7, 9, 11-13 and 15-33 is based on impermissible hindsight. Brief, pages 6-11; Reply Brief, pages 11-13. Specifically, Appellants point out that the examiner has acknowledged that Sony '649 differs from the claims in that Sony '649 is silent with respect to the D.E. value of the disclosed starch moiety, in that Sony '649 discloses the use of only cyclic urethane derivatives, and in that the compounds prepared in Sony '649 have different physicochemical properties than the claimed compounds. Brief, page 7. Despite the acknowledged differences between the claims and prior art, urge Appellants, the examiner "cherry picks from a secondary reference Sony '775, to make a case for obviousness." Id.

We do not agree that only through the use of impermissible hindsight would one of ordinary skill have selected a starch hydrolysate as the polysaccharide moiety in Sony '649's urethane derivatives. As noted supra, paragraph [0007] of Sony '649 discloses that, when using a polysaccharide hydrolysate as the carbohydrate moiety of the disclosed urethane derivatives, one may select from three specifically named candidates -- cellulose, pullulan and starch. In our view, selecting from a list of three items does not involve hindsight. Even if the separately discussed polysaccharide derivatives -- cellulose ester, cellulose ether and chitosan (Sony '649, paragraph [0008]) -- are added to the list, one of ordinary skill had only six polysaccharides from which to choose. We do not agree that choosing from a list of six specifically named candidates involves impermissible hindsight.

Appellants also argue that Sony '649 "generically discloses that carbohydrates produced by hydrolysis of polysaccharides, such as cellulose or starch, are suitable

source materials for the manufacture of urethanes. However, Sony '649 only discloses generically cellulose, pullulan and hydrolysates of these polysaccharides as source materials." Appeal Brief, page 7. Thus, urge Appellants, "Sony '649 does not explicitly teach, exemplify or suggest starch hydrolysates, much less starch hydrolysates of DE ranging from 1 to 47, as source material or as the carbohydrate moiety of urethanes as required by Applicants' independent claims 1 and 9" Id.; see also Reply Brief, at pages 4 and 12. Appellants also point out that Sony '775 does not disclose a starch hydrolysate as the carbohydrate moiety in its polysaccharide urethane derivatives. Appeal Brief, pages 8-9; Reply Brief, page 9.

We do not agree that Sony '649 and '775 fail to disclose or suggest the use of a starch hydrolysate having the claimed D.E. value. As discussed at length supra, in our view Sony '649's disclosure in paragraph [0007] of the suitability of hydrolysates wherein "starch . . . will be mentioned" as the polysaccharide, and wherein suitable hydrolysates contain "trisaccharide [or] . . . tetrasaccharide," with hydrolysates of "seven or more molecules condensed" being "especially . . . suitable," suggests the use of a starch hydrolysate of having a D.E. of 1 to 47.

Appellants further argue that "Sony '649 merely generically discloses aromatic isocyanates (namely phenyl and substituted phenyl isocyanates) and cycloalkyl isocyanates (namely cyclohexyl isocyanate) as source materials for the preparation of urethanes (see Sony '649 [0009]), and discloses in particular as individualized and materialized urethanes only phenyl and substituted phenyl urethanes" Brief, page 8; see also Reply Brief, page 4. Thus, urge Appellants, "the urethanes disclosed by Sony '649 are different from the ones according to the claimed invention in view of

both moieties of the molecules, namely the carbohydrate moiety and the carbamoyl moiety.” Brief, page 8; see also Reply Brief, page 5. Regarding Sony ‘775, Appellants similarly urge that the reference “only specifically teaches cellulose phenyl urethane and pullulan phenyl urethane.” Appeal Brief, page 9.

We note, as argued by Appellants, that none of the working examples in Sony ‘649 and ‘775 uses the claimed starch moiety or claimed carbamate, i.e. isocyanate, moiety. However, in our view, by focusing almost exclusively on the references’ examples, Appellants construe the references too narrowly, ignoring critical disclosures. Specifically, “in a section 103 inquiry, ‘the fact that a specific [embodiment] is taught to be preferred is not controlling, since all disclosures of the prior art, including unpreferred embodiments, must be considered.’” Merck & Co. Inc. v. Biocraft Labs., Inc., 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989) quoting In re Lamberti, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976).

Thus, “[a]ll the disclosures in a reference must be evaluated, including nonpreferred embodiments, and a reference is not limited to the disclosure of specific working examples.” In re Mills, 470 F.2d 649, 651, 176 USPQ 196, 198 (CCPA 1972) (citations omitted). Sony ‘649’s failure to exemplify a starch hydrolysate as the polysaccharide moiety does not therefore negate the reference’s disclosure, at paragraph [0007], that a hydrolysate of starch is suitable as the polysaccharide moiety in a polysaccharide urethane derivative useful in video photographic paper coatings. Similarly, the failure of Sony ‘775 to use octyl isocyanate in a working example preparing a polysaccharide urethane derivative does not negate the disclosure in Sony ‘775, at paragraph [0012], that octyl isocyanate is useful as the isocyanate moiety in

preparing polysaccharide urethane derivatives having utility in video photographic paper coatings.

Appellants further urge that the urethanes disclosed by Sony '649 are used only in film products, "in particular as a component of video printing paper[,]" and that the reference "is absolutely silent about surface-active properties of (poly)saccharide urethanes and their use as a surface-active agent in accordance with Appellants' claimed invention." Appeal Brief, page 8.

We are aware that neither Sony '649 nor Sony '775 discloses the surface active properties of the polysaccharide urethane derivatives suggested therein, and that the references produce the disclosed polysaccharide urethane derivatives for use as components in coatings for video photographic paper, rather than for their surfactant properties. However, in this regard we note initially that claim 9 does not contain any limitation requiring the glucoside alkyl urethane to have surfactant properties.

Moreover, "it is not necessary in order to establish a prima facie case of obviousness that both a structural similarity between a claimed and prior art compound (or a key component of a composition) be shown and that there be a suggestion in or expectation from the prior art that the claimed compound or composition will have the same or a similar utility as one newly discovered by applicant." In re Dillon, 919 F.2d at 692-93, 16 USPQ2d at 1901 (emphases in original).

Dillon therefore makes it clear that a chemical compound may be held prima facie obvious despite the fact that the prior art's reason for preparing the compound is different than Appellants'. Thus, the product of claim 9 and the process of claim 14 are properly considered prima facie obvious because, as discussed supra, Sony '649 and

'775 suggest the preparation of the claimed polysaccharide urethane derivative, using the claimed process steps. The fact that the prior art suggests the preparation of the urethane derivative for a purpose or end use different from Appellants' does not mean that the claimed urethane derivative and its method of making is any less obvious. See id.

Appellants also argue that the obviousness rejection of product claims 1-7, 9, 11-13, and 15-33 is contrary to the Manual of Patent Examining Procedures (MPEP) § 2144.08. Brief, pages 11-12. Specifically, Appellants point out that "[t]he fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a prima facie case of obviousness." Id., at page 11 (citing In re Baird, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994) and In re Jones, 958 F.2d 347, 350, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992)). Thus, urge Appellants, "[t]o establish a prima facie case of obviousness in a genus-species chemical composition situation, as in any other 35 U.S.C. § 103 case, it is essential that the Examiner find some motivation or suggestion to make the claimed invention in light of the prior art teachings." Id. (citing In re Brouwer, 77 F.3d 422, 425, 37 USPQ2d 1663, 1666 (Fed. Cir. 1996)). Furthermore, urge Appellants, contrary to the requirements in MPEP § 2144.08, the rejection does not properly compare the generic disclosure in the prior art to the claimed species or subgenus. Id., at page 12.

We do not agree that the examiner's obviousness rejection of claims 9 and 14 is contrary to the MPEP § 2144.08 and the cases cited therein, specifically In re Baird,

16 F.3d 380, 29 USPQ2d 1550, and In re Jones, 958 F.2d 347, 21 USPQ2d 1941. In our view, the facts before us are readily distinguishable from the situations presented in those cases.

Specifically, in In re Jones the court considered the obviousness of a claimed compound that was encompassed by a prior art reference's broad generic disclosure. Jones, 958 F.2d at 349-350, 21 USPQ2d at 1943. Pointing out that the genus disclosed in the primary reference was "potentially infinite," and that the claimed compound contained significant structural differences when compared to the primary reference, the court reasoned that the claimed compound could not be considered obvious without some "suggestion . . . , found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art" for combining the cited references to arrive at the claimed compound. Id., at 350-351, 21 USPQ2d at 1943-44. Similarly, the court in In re Baird, citing Jones, held a claim reciting a bisphenol A polyester nonobvious over prior art disclosing a generic formula encompassing "more than 100 million different diphenols[,]” where the reference's disclosure of fifteen preferred compounds did not disclose, or even suggest bisphenol A. Baird, 16 F.3d at 382, 29 USPQ2d at 1552.

Contrary to the situations in Jones and Baird, Sony '649 and Sony '775 disclose limited genera and provide guidance that would have led the skilled artisan to the species recited in the instant claims. As pointed out above, paragraph [0007] of Sony '649 discloses that, when using a polysaccharide hydrolysate as the carbohydrate moiety of the disclosed urethane derivatives, one may select from three specifically named candidates -- cellulose, pullulan and starch -- with hydrolysates of "seven or

more molecules condensed” being “especially . . . suitable.” Thus, rather than presenting an extremely broad genus without guidance as to which species to select, Sony ‘649 provides a limited selection of polysaccharide moieties and directly suggests the claimed polysaccharide moiety consisting of a starch hydrolysate having a relatively high molecular weight.

With respect to the isocyanate moiety, Sony ‘649 and Sony ‘775 respectively disclose four and seven specific isocyanates (Sony ‘649 at [0009]; Sony ‘775 at [0012]), useful in preparing polysaccharide urethane derivatives for video photographic paper. At least two of the compounds disclosed by the references overlap (phenyl isocyanate and cyclohexyl isocyanate).³ Thus, Sony ‘649 and Sony ‘775 disclose at most nine different isocyanate compounds which can be used to prepare polysaccharide urethane derivatives. Again, contrary to Appellants’ argument, the references’ specific disclosure of a limited number of preferred candidate compounds, including one encompassed by Appellants’ claims, goes well beyond the broad generic disclosures encompassing hundreds of millions of compounds, discussed in Jones and Baird.

In our view the court’s decision in Merck & Co. Inc. v. Biocraft Labs., Inc. governs the fact situation before us more closely than the decisions in Jones and Baird. In a genus-species situation of the type addressed in Jones and Baird, the court in Merck considered the obviousness of claims directed to diuretic compositions comprising two particular ingredients in a specific ratio. Merck, 874 F.2d at 805-807, 10 USPQ2d at 1844-1846. A prior art reference disclosed over 1200 possible combinations of two

³ The compounds listed in Sony ‘775 include “toluyl one” isocyanate. It is unclear whether this corresponds to either of Sony ‘649’s “m-tolyl isocyanate” or “P-tolyl isocyanate.”

ingredient types useful in diuretic compositions, the combination of ingredients in the claims at issue being one of the disclosed combinations. Id. at 806-807, 10 USPQ2d at 1845-1846. Neither of the claimed ingredients was listed by the reference as being preferred. Id. The court nonetheless held the claims to be obvious in view of the reference's explicit teaching that any one of the claimed compositions would produce a diuretic composition having desirable properties. Id. at 807, 10 USPQ2d at 1845-1846.

In a situation analogous to that in Merck, claim 9 recites a compound having two moieties disclosed in the prior art as being suitably combined to prepare coatings for video photographic paper: (1) hydrolyzed starch (a polysaccharide moiety) and (2) a linear alkyl isocyanate moiety. The cited references disclose a limited number of possible polysaccharide moieties (cellulose, pullulan, starch, and hydrolysates thereof, cellulose ester, cellulose ether, chitosan and chitin) which are useful in the preparation of polysaccharide derivatives useful in video photographic paper coatings. See Sony '649, at [0007] and [0008]; Sony '775, at [0012]. As discussed supra, the cited references also disclose nine specific potential isocyanate moieties useful in the preparation of polysaccharide derivatives useful in video photographic paper coatings. See Sony '649, at [0009]; Sony '775, at [0012]. Thus, the potential combinations presented by the references cited in the examiner's rejection are far fewer than the number held by the court in Merck to be obvious. In our view the limited number of potential combinations suggested by the references cited by the examiner is not analogous to the unguided generic disclosures in Jones and Baird, but rather mirrors the disclosure of specific equivalent embodiments in the manner of the reference analyzed in Merck.

In sum, in our view, Sony '649 and Sony '775 would have suggested the subject matter of claims 9 and 14 to those of ordinary skill in the art. The rejection of claims 9 and 14 is affirmed. Claims 1-7, 11-13, and 15-33 fall with claim 9.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

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