

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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

---

Appeal No. 2006-2677  
Application No. 10/346,099

---

ON BRIEF

---

Before SCHEINER, GRIMES, and LINCK, Administrative Patent Judges.

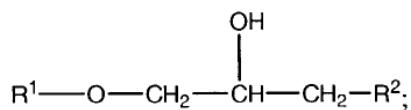
GRIMES, Administrative Patent Judge.

#### DECISION ON APPEAL

This appeal involves claims to a thermoset and a process for making a thermoset. The examiner has rejected the claims as anticipated or obvious. We have jurisdiction under 35 U.S.C. § 134. We reverse.

#### Background

The specification describes a process of making a thermoset comprising reacting a polyol monomer with a polyisocyanate. Page 2. An isocyanate is represented by the general formula R-N=C=O. See the encyclopedia entry for isocyanate included in the Evidence Appendix. The polyol monomer has the following formula:



where  $R^1$  is aliphatic or aromatic and  $R^2$  is aliphatic, aromatic, ester, ether, or acrylic.

In addition,  $R^1$  contains a hydroxyl group and/or  $R^2$  contains  $-O-CH_2-CH(OH)-$ . Page 2.

The specification states that the  $R^1-O-$  group can be described as a residue of an alcohol. Page 5.

In addition, the specification describes a process of making a thermoset by reacting an epoxy with an alcohol to make a polyol monomer, wherein the epoxy contains more than one epoxide group and/or the alcohol is a polyol, and reacting the polyol monomer with a polyisocyanate. Page 2. The specification states that the epoxy may be a glycidyl ether. Page 5.

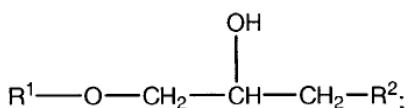
### Discussion

#### 1. Claim construction

Claims 9-11 and 13-41 are pending and on appeal. We will focus on claims 9, 21, and 31, which read as follows:

9. A thermoset formed by reacting a polyisocyanate with a polyol monomer;

wherein the polyol monomer comprises the formula:



wherein  $R^1-O-$  is a residue of an alcohol selected from the group consisting of methanol, ethanol, propanol, butanol, 1,2-ethane-diol, isopropanol, 1,2-propane-diol, 1,3-propane-diol, 1,3-cyclohexane-diol, a glycol, and a  $C_{15}$  alcohol;

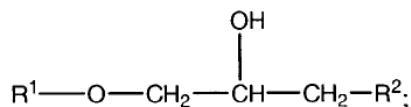
wherein  $R^2$  is selected from the group consisting of aliphatic, aromatic, ester, ether, and acrylic group; and

wherein R<sup>2</sup> contains -O-CH<sub>2</sub>-CH(OH)-.

21. A process of making a thermoset comprising the steps of:  
providing a glycidyl ether and an alcohol;

wherein the glycidyl ether contains more than one epoxide groups;  
reacting the glycidyl ether with the alcohol to make a polyol monomer; and  
reacting the polyol monomer with a polyisocyanate.

31. A process of making a thermoset comprising the steps of:  
providing a polyol monomer comprising



wherein R<sup>1</sup> is selected from the group consisting of aliphatic and aromatic;

wherein R<sup>2</sup> is selected from the group consisting of aliphatic, aromatic, ester, ether, and acrylic group;

wherein R<sup>2</sup> contains -O-CH<sub>2</sub>-CH(OH)-; and

reacting the polyol monomer with a polyisocyanate.

Thus, claim 9 is directed to a thermoset formed by reacting a polyisocyanate with a polyol monomer having a specified formula.

Claim 21 is directed to a process of making a thermoset by reacting a glycidyl ether containing more than one epoxide group with an alcohol to make a polyol monomer, then reacting the polyol monomer with a polyisocyanate.

Claim 31 is directed to a process of making a thermoset comprising reacting a polyol monomer having a specified formula with a polyisocyanate.

The specification states that “the prefix poly- . . . means two or more of the specified functional group.” Page 2. In addition, the specification states that “the term

‘polyisocyanate’ includes both monomeric isocyanates and polymeric isocyanates that contain more than one isocyanate functional group.” Page 7. Thus, we interpret a “polyisocyanate” to have two or more isocyanate groups.

## 2. Anticipation

The examiner has rejected claims 9-11, 13-18, 21-26, 28, and 31-38 under 35 U.S.C. § 102(b) as anticipated by Holubka.<sup>1</sup> Holubka describes oligomers comprising the reaction product of a polyol with a half-blocked diisocyanate. Col. 3, lines 35-37.

With regard to claim 21, the examiner argues that Holubka discloses “a process of making a thermoset comprising the steps of: (a) providing a glycidyl ether and an alcohol (column 3, lines 64 through column 4, line 20); wherein the glycidyl ether contains more than one epoxide groups (column 4, lines 21-62); (b) reacting the glycidyl ether with the alcohol to make a polyol monomer (column 5, lines 43-60); and (c) reacting the polyol monomer with polyisocyanate (column 6, line 61 through column 7, line 27).” Examiner’s Answer, page 4. With regard to claim 31, the examiner argues that Holubka discloses “a process of making a thermoset comprising the steps of: (a) providing a polyol monomer comprising [the formula of claim 31] (column 4, line 19 through column 5, line 60) . . .; and (b) reacting the polyol monomer with a polyisocyanate (column 6, line 61 through column 7, line 27).” Examiner’s Answer, page 5. The examiner argues that “[a] half-blocked diisocyanate is still considered a diisocyanate.” Examiner’s Answer, page 12.

---

<sup>1</sup> Holubka et al. (Holubka), U.S. Patent No. 4,554,188, issued November 19, 1985.

Appellants argue that “Holubka does not disclose the limitation that the polyol monomer is reacted with a polyisocyanate. In one step, Holubka reacts a polyol (epoxydiol adduct) with a half-blocked diisocyanate (col. 3, lines 66-67). In another step, Holubka reacts a polyol having a blocked diisocyanate group (chain-extendable, crosslinkable urethane modified polyhydroxy oligomer) with a curing agent. . . . [S]ince a blocked isocyanate group is not an isocyanate group, there is no disclosure of a reaction of a polyol with a polyisocyanate. There is only a reaction of a polyol with a monoisocyanate.” Appeal Brief, page 6.

We agree with Appellants that a half-blocked diisocyanate is not a polyisocyanate. As discussed above, an isocyanate is represented by the general formula R-N=C=O. The encyclopedia entry for isocyanate included in the Evidence Appendix indicates that isocyanates are “very reactive compounds” that react with alcohols to form urethanes. A blocked isocyanate is one that has been reacted with a monofunctional blocking agent. Holubka, col. 6, lines 14-17. Although a blocked isocyanate can be de-blocked, the blocked isocyanate presumably does not have the general formula R-N=C=O, nor does it have the reactivity with alcohol that an unblocked isocyanate has. Id., col. 6, lines 17-21, 35-39, and 61-67. Thus, we agree with Appellants that a half-blocked diisocyanate does not have two or more isocyanate groups. As a result, we agree with Appellants that Holubka does not describe reacting a polyol monomer with a polyisocyanate, as recited in claims 21 and 31.

With regard to claim 9, the examiner argues that Holubka discloses “a thermoset formed by reacting a polyisocyanate with a polyol monomer (column 3, lines 64 through column 4, line 20); wherein the polyol monomer comprises the formula [of claim 9]

(column 4, line 19 through column 5, line 60).” Examiner’s Answer, page 3. In particular, the examiner notes that Holubka, at column 4, lines 21-26, discloses that the “[p]REFERRED chain-extendable, crosslink-able oligomers . . . are the reaction product of (1) half-blocked diisocyanates with (2) certain preferred polyols. These (2) preferred polyols comprise an epoxy-diol adduct, more specifically the reaction product of a suitable diepoxide with diol.” Examiner’s Answer, page 10. In addition, the examiner notes that the “[p]REFERRED diols include ethylene glycol (*1,2-ethane-diol*) and 1,3-propanediol (column 5, lines 19-24).” Id. The examiner argues that “the resulting polyol (*epoxy-diol adduct*) corresponds with the polyol set forth in claim 9. . . . This polyol (*epoxy-diol adduct*) is then reacted with a half-blocked diisocyanate (*half-blocked polyisocyanate*) to form a chain-extendable, crosslink-able oligomer,” which anticipates claim 9. Examiner’s Answer, page 11.

Appellants argue that “Holubka discloses only reacting a polyol with a half-blocked diisocyanate. Since a blocked isocyanate group is not an isocyanate group, this is not a reaction of a polyol with a polyisocyanate. It is a reaction of a polyol with a monoisocyanate. Further, a reaction of a polyol with a half-blocked diisocyanate does not produce a thermoset as recited in present claim 9.” Appeal Brief, page 5.

We agree with Appellants that the examiner has not set forth a prima facie case that Holubka anticipates claim 9. As discussed above, we agree with Appellants that a half-blocked diisocyanate is not a polyisocyanate. In addition, the examiner has not set forth sufficient basis to conclude that reacting a half-blocked diisocyanate with a polyol would result in the same product as reacting an unblocked diisocyanate with a polyol.

The examiner has not set forth a prima facie case that claims 9, 21, and 31 are anticipated by Holubka. Each of claims 10, 11, 13-18, 22-26, 28, and 32-38 depend from one of claims 9, 21, and 31. We therefore reverse the anticipation rejection of claims 9-11, 13-18, 21-26, 28, and 31-38.

### 3. Obviousness

The examiner has rejected claims 30, 40, and 41 under 35 U.S.C. § 103 as obvious over Holubka. Claim 30 depends from claim 21 and claims 40 and 41 depend from claim 31. We have already concluded that the examiner has not adequately shown that Holubka anticipates claims 21 or 31. In addition, the examiner has not set forth sufficient basis to conclude that the methods of claims 21 and 31 would have been obvious over Holubka. As a result, we agree that the examiner has not set forth a prima facie case that claims 30, 40, or 41, which depend from either claim 21 or claim 31, would have been obvious over Holubka. We reverse the obviousness rejection of claims 30, 40, and 41.

The examiner has rejected, under 35 U.S.C. § 103, claims 19 and 20 as obvious over Holubka in view of Sachs<sup>2</sup>; claim 27 as obvious over Holubka in view of Widmer<sup>3</sup>; and claims 29 and 39 as obvious over Holubka in view of Martz.<sup>4</sup> Claims 19, 20, 27, 29, and 39 each depend from one of claims 9, 21, and 31. We have already concluded that the examiner has not adequately shown that claims 9, 21, or 31 are unpatentable over Holubka. The examiner relies on Sachs, Widmer, and Martz for limitations recited in dependent claims, and has not pointed to any disclosure in these references that would

---

<sup>2</sup> Sachs et al. (Sachs), U.S. Patent No. 4,196,243, issued April 1, 1980.

<sup>3</sup> Widmer et al. (Widmer), U.S. Patent No. 2,700,030, issued January 18, 1955.

<sup>4</sup> Martz et al. (Martz), U.S. Patent No. 5,066,733, issued November 19, 1991.

make up for the deficiencies discussed above. Thus, we conclude that the examiner has not set forth a prima facie case that claims 19, 20, 27, 29, and 39 would have been obvious. We therefore reverse the obviousness rejections of these claims.

Other Issues

As noted above, we agree with Appellants that the examiner has not set forth a prima facie case that Holubka anticipates claims 9, 21, or 31. However, the examiner should consider whether the cured product of Holubka anticipates or renders obvious claim 9 or any of the claims that depend from claim 9. In this regard, we note that Appellants are using the term “thermoset” to read on a product that is “solidified without the use of a catalyst or heating.” Specification, page 11. See also, the Reply Brief, where Appellants argue that a “thermoset is a crosslinked polymer.”

The examiner should also consider whether Martz anticipates or renders obvious any of the claims, for example, claim 21. Martz describes a urethane resin prepared by reacting (A) an isocyanate-terminated prepolymer, which is the product of reacting an organic polyisocyanate with an organic polyol, with (B) an unsaturated monomer containing an isocyanate reactive group. Col. 1, lines 54-63. Martz broadly describes the organic polyol and specifically includes epoxy polyols, which can be prepared by reacting glycidyl ethers of polyphenols, such as diglycidyl ether of 2,2-bis(4-hydroxyphenol)propane, with polyphenols. Col. 3, lines 54-61; col. 5, lines 42-45.

Summary

The examiner has not shown that the claims were anticipated or would have been obvious to a person of ordinary skill in the art based on the applied references. We therefore reverse the rejections of claims 9-11 and 13-41.

REVERSED

Toni R. Scheiner )  
Administrative Patent Judge )  
                       )  
                       )  
                       )  
                       ) BOARD OF PATENT  
Eric Grimes         )  
Administrative Patent Judge     )  
                       )  
                       )  
                       ) APPEALS AND  
Nancy J. Linck     )  
Administrative Patent Judge     )  
                       )

Naval Research Laboratory  
Associate Counsel (Patents)  
Code 1008.2  
4555 Overlook Avenue, SW  
Washington, DC 20375-5320

EG/MLM/hs