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(12) **United States Patent**
Lipiecki et al.

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(54) **METHOD OF REDUCING A FERMENTATION AND/OR ENZYME INHIBITOR IN A SACCHARIDE-CONTAINING COMPOSITION**

FOREIGN PATENT DOCUMENTS

WO WO 2011/080129 A2 7/2011
WO WO 2011/080130 A2 7/2011
WO WO 2013/122903 A1 8/2013

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OTHER PUBLICATIONS

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Lichtenthaler, *Green Chemistry*, 2001, 3, 201-209.*
Layer, Amines, Aromatic Phenylenediamines, Amines, Aromatic, Kirk-Othmer Encyclopedia of Chemical Technology, Dec. 4, 2000.*
Larsen, Solid-Supported Reagents for Organic Synthesis, MacMillan Group Meeting, Dec. 6, 2001.*

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Cavka et al., "Detoxification of lignocellulosic hydrolysates using sodium borohydride," *Bioresource Technology* 136, 368-376 (2013).
Jönsson et al., "Bioconversion of lignocelluloses: inhibitors and detoxification," *Biotechnology for Biofuels*, 6:16, 1-10 (2013).

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 24 days.

Larsson et al., "Comparison of Different Methods for the Detoxification of Lignocellulose Hydrolysates of Spruce," *Applied Biochemistry and Biotechnology*, 77-79, 91-103 (1999).

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Palmqvist et al., "Fermentation of lignocellulosic hydrolysates. I: inhibition and detoxification," *Bioresource Technology* 74, 17-24 (2000).

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Palmqvist et al., "Fermentation of lignocellulosic hydrolysates. II: inhibitors and mechanisms of inhibition," *Bioresource Technology* 74, 25-33 (2000).

(65) **Prior Publication Data**

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* cited by examiner

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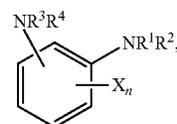
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(57) **ABSTRACT**

Provided is a method of treating a saccharide-containing composition, the method comprising contacting a composition containing a saccharide with a compound of formula (I) or a salt thereof

(58) **Field of Classification Search**
None
See application file for complete search history.



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,208,370 A 5/1993 Bauer, Jr. et al.
6,274,212 B1* 8/2001 Rule et al. 428/36.92
2002/0142410 A1* 10/2002 Rangel-Aldao C12C 5/02
435/161
2011/0008826 A1* 1/2011 Hanakawa et al. 435/41

wherein R¹-R⁴, X, and n are as described herein. Further provided is a composition comprising a saccharide and a compound of formula (I) or a salt thereof.

26 Claims, No Drawings