US009410074B2

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

(10) **Patent No.: US 9,410,074 B2**
(45) **Date of Patent: *Aug. 9, 2016**

(54) **COMPOSITIONS AND METHODS FOR INHIBITING NAPHTHENATE SOLIDS FORMATION FROM LIQUID HYDROCARBONS**

(75) Inventors: **Chandrashekhar Khandekar**, Katy, TX (US); **Suguna Gopal**, Dubai (AE); **James Smith**, Bentley (AU)

(73) Assignee: **M-I L.L.C.**, Houston, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/511,770**

(22) PCT Filed: **Nov. 25, 2010**

(86) PCT No.: **PCT/AU2010/001584**

§ 371 (c)(1),
(2), (4) Date: **Aug. 15, 2012**

(87) PCT Pub. No.: **WO2011/063459**

PCT Pub. Date: **Jun. 3, 2011**

(65) **Prior Publication Data**

US 2012/0310022 A1 Dec. 6, 2012

(30) **Foreign Application Priority Data**

Nov. 26, 2009 (AU) 2009905893

(51) **Int. Cl.**

C07C 7/10	(2006.01)
C11D 17/08	(2006.01)
A61K 8/73	(2006.01)
C09K 8/524	(2006.01)

(52) **U.S. Cl.**

CPC ***C09K 8/524*** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,556,451	A	9/1996	Minevski	
6,096,196	A	8/2000	Varadaraj et al.	
2004/0023817	A1	2/2004	Taylor et al.	
2004/0147404	A1 *	7/2004	Thaemlitz et al.	507/100
2005/0267007	A1	12/2005	Sanner et al.	
2005/0282711	A1	12/2005	Ubbels et al.	
2005/0282915	A1	12/2005	Ubbels	
2007/0125987	A1	6/2007	Hills et al.	
2010/0175315	A1	7/2010	McRobbie et al.	
2011/0237469	A1 *	9/2011	Khandekar et al.	507/235

FOREIGN PATENT DOCUMENTS

CN	101508650	A	8/2009	
EP	1293550	A2	3/2003	
GB	847762	A	9/1960	
WO	2004065518	A1	8/2004	
WO	WO2005100534	*	10/2005	C11D 17/00
WO	2006025912	A2	3/2006	
WO	2007065107	A2	6/2007	
WO	2008155333	A1	12/2008	
WO	2010017575	A1	2/2010	

OTHER PUBLICATIONS

Goldszal, et al., "Scale and Naphthenate Inhibition in Deep-Offshore Fields", SPE 74661, SPE Oilfield Scale Symposium, Aberdeen, UK, Jan. 2002, pp. 1-11.

International Preliminary Report on Patentability issued in PCT/AU2010/001219 on Mar. 29, 2012, 10 pages.

Patent Examination Report No. 1 issued in Australia Patent Application No. 2010295249 on Sep. 20, 2013, 3 pages.

International Preliminary Report on Patentability issued in PCT/AU2010/001584 on Jun. 7, 2012, 11 pages.

Patent Examination Report No. 1 issued in Australia Patent Application No. 201324533 on Jan. 8, 2013, 4 pages.

European Search Report issued in Application No. 10832421.1 on Aug. 21, 2013; 9 pages.

Petroleum Extension Service, "Treating Oilfield Emulsions", University of Texas at Austin, 4th Edition, Apr. 1, 1990, 115 pages.

Examination Report issued in AU2014240322 on Jul. 10, 2015, 4 pages.

Search Report issued in AU2009905893 on Jun. 16, 2010, 3 pages.

* cited by examiner

Primary Examiner — Clinton Brooks

(57) **ABSTRACT**

The present invention relates to a composition and method for inhibiting the formation of naphthenate solids in a liquid hydrocarbon. The method includes contacting a composition including a rosin amine having a formula (I): or (II): where