US007972640B2

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

(10) **Patent No.: US 7,972,640 B2**
(45) **Date of Patent: Jul. 5, 2011**

(54) **LEMON/LIME FLAVORED BEVERAGES HAVING IMPROVED STABILITY**

(75) Inventors: **Thomas Lee**, Scarsdale, NY (US); **Pei Chang**, Cortlandt Manor, NY (US); **Zena Bell**, Hartsdale, NY (US)

(73) Assignee: **Pepsico, Inc.**, Purchase, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 86 days.

(21) Appl. No.: **12/495,276**

(22) Filed: **Jun. 30, 2009**

(65) **Prior Publication Data**

US 2009/0263558 A1 Oct. 22, 2009

Related U.S. Application Data

(62) Division of application No. 10/628,420, filed on Jul. 29, 2003, now Pat. No. 7,572,471.

(60) Provisional application No. 60/398,790, filed on Jul. 29, 2002.

(51) **Int. Cl.**
A23L 2/00 (2006.01)

(52) **U.S. Cl.** **426/330.3**; 426/650

(58) **Field of Classification Search** 426/650, 426/330.3, 531

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,245,798	A	4/1966	Van Ness
3,413,125	A	11/1968	Schuppner, Jr.
3,416,930	A	12/1968	Irani
4,551,342	A	11/1985	Nakel et al.
4,612,205	A	9/1986	Kupper et al.
4,722,847	A	2/1988	Heckert
4,737,375	A	4/1988	Nakel et al.
4,740,380	A	4/1988	Melachouris et al.
4,746,527	A	5/1988	Kuypers
4,830,862	A	5/1989	Braun et al.
4,871,554	A	10/1989	Kalala et al.
4,919,963	A	4/1990	Heckert
5,032,411	A	7/1991	Stray-Gundersen
5,114,723	A	5/1992	Stray-Gundersen
5,219,598	A	6/1993	Anderson et al.
5,310,570	A	5/1994	Kwapong et al.
5,348,756	A	9/1994	Lee et al.
5,472,716	A	12/1995	Kwapong et al.
5,817,351	A	10/1998	DeWille et al.
5,866,190	A	2/1999	Barey
5,976,602	A	11/1999	Baron et al.
6,068,869	A	5/2000	Bent Ginslov
2002/0102331	A1	8/2002	Chang et al.
2003/0021878	A1	1/2003	Nunes et al.
2003/0035880	A1	2/2003	Heisey et al.

FOREIGN PATENT DOCUMENTS

EP	0244903	A1	4/1987
GB	2207335	A	2/1989
WO	9858656	A1	12/1998
WO	0232236	A2	4/2002
WO	03003849	A2	1/2003
WO	03003850	A1	1/2003

OTHER PUBLICATIONS

Freeburg, E.J. et al., "Stability of Citral-Containing and Citralless Lemon Oils in Flavor Emulsions and Beverages," Perfumer & Flavorist, Jul./Aug. 1994, pp. 23-32, vol. 19, Allured Publishing Corp.

Prager, Jan C., "Adipic Acid," Environmental Contaminant Reference Databook, vols. 1-3, 1998, pp. 1-6, John Wiley & Sons.

Dean, J.A. Lange's Handbook of Chemistry (15th Edition), 1999, pp. 1-4, McGraw-Hill.

Igoe, Robert S. et al., Dictionary of Food Ingredients (4th Edition), 2001, pp. 35, 86, 138, Springer-Verlag.

Primary Examiner — Keith D Hendricks
Assistant Examiner — Jyoti Chawla
(74) *Attorney, Agent, or Firm* — Banner & Witcoff, Ltd

(57) **ABSTRACT**

A combination of an acidulant system and a buffer salt system is included in lemon/lime flavored beverages to achieve improved stability. The acidulant system includes citric acid and/or phosphoric acid and an additional organic acid having a smaller dissociation constant than both phosphoric acid and citric acid; the buffer salt system includes a citrate salt and a phosphate salt.

21 Claims, No Drawings