US010610707B2

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

(10) **Patent No.: US 10,610,707 B2**
(45) **Date of Patent: Apr. 7, 2020**

(54) **ORAL CARE PRODUCT FOR SENSITIVE ENAMEL CARE**

(75) Inventors: **Shira Pilch**, Highland Park, NJ (US); **James Gerald Masters**, Ringoes, NJ (US); **Zhi Lu**, Phillipsburg, NJ (US); **Davide Miksa**, Doylestown, PA (US)

(73) Assignee: **Colgate-Palmolive Company**, New York, NY (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.

(21) Appl. No.: **13/574,205**

(22) PCT Filed: **Jan. 28, 2011**

(86) PCT No.: **PCT/US2011/022867**

§ 371 (c)(1),
(2), (4) Date: **Jul. 19, 2012**

(87) PCT Pub. No.: **WO2011/094499**

PCT Pub. Date: **Aug. 4, 2011**

(65) **Prior Publication Data**

US 2012/0288455 A1 Nov. 15, 2012

Related U.S. Application Data

(60) Provisional application No. 61/299,650, filed on Jan. 29, 2010.

(51) **Int. Cl.**

A61K 8/19	(2006.01)
A61K 8/25	(2006.01)
A61Q 11/00	(2006.01)
A61K 33/06	(2006.01)
A61K 8/27	(2006.01)
A61K 8/81	(2006.01)

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

CPC ***A61Q 11/00*** (2013.01); ***A61K 8/19*** (2013.01); ***A61K 8/25*** (2013.01); ***A61K 8/27*** (2013.01); ***A61K 8/8164*** (2013.01)

(58) **Field of Classification Search**

CPC ... A61K 8/19; A61K 8/27; A61K 8/25; A61K 8/8164; A61Q 11/00

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,538,230	A		11/1970	Pader et al.
3,956,480	A		5/1976	Dichter et al.
3,966,863	A		6/1976	Forward et al.
3,980,767	A		9/1976	Chown et al.
3,996,863	A		12/1976	Osborn
4,110,083	A		8/1978	Benedict
4,138,477	A		2/1979	Gaffar
4,138,914	A		2/1979	Reeder
4,198,394	A		4/1980	Faunce
4,217,343	A		8/1980	Gaffar et al.
4,314,990	A		2/1982	Denny, Jr. et al.
4,328,205	A		5/1982	Taylor
4,358,437	A		11/1982	Duke
4,373,036	A		2/1983	Chang et al.
4,485,090	A		11/1984	Chang
4,521,551	A		6/1985	Chang et al.
4,532,124	A		7/1985	Pearce
4,634,589	A		1/1987	Scheller
4,853,367	A		8/1989	Henzel et al.
4,961,924	A	*	10/1990	Suhonen 424/52
4,992,258	A		2/1991	Mason
5,015,467	A	*	5/1991	Smitherman 424/52
5,028,413	A		7/1991	Bianchi et al.
5,032,178	A		7/1991	Cornell
5,188,821	A		2/1993	Gaffar
5,192,531	A		3/1993	Gaffar et al.
5,240,697	A		8/1993	Norfleet et al.
5,310,543	A		5/1994	Dawson
5,334,375	A		8/1994	Nabi et al.
5,352,439	A		10/1994	Norfleet et al.
5,354,550	A		10/1994	Collins et al.
5,356,615	A	*	10/1994	Gaffar 424/49
5,505,933	A		4/1996	Norfleet et al.
5,603,922	A		2/1997	Winston et al.
5,605,677	A		2/1997	Schumann et al.
5,624,652	A		4/1997	Aldcroft et al.
5,645,853	A		7/1997	Winston et al.
5,723,105	A		3/1998	Viscio et al.
5,833,957	A		11/1998	Winston et al.
5,843,406	A	*	12/1998	Mordarski A61K 8/24 424/49
5,876,701	A		3/1999	Wong et al.

(Continued)

FOREIGN PATENT DOCUMENTS

EP	0102200	3/1984
EP	0467548	1/1992

(Continued)

OTHER PUBLICATIONS

International Search Report and Written Opinion in International Application No. PCT/US2011/022867, dated Nov. 30, 2012.

Van Der Reijden et al., 1997, "Influence of polymers for use in saliva substitutes on de- and remineralization of enamel in vitro," Caries Research 31(3):216-223.

Acevedo et al., 2005, "The Inhibitory Effect of an Arginine Bicarbonate/Calcium Carbonate (CaviStat®)-Containing Dentifrice on the Development of Dental Caries in Venezuelan School Children," J. Clin. Dent. 16:63-70.

Amaechi et al., 2005, "Dental Erosion: Possible Approaches to Prevention and Control," J. Dentistry 33(3):243-252.

Anonymous, 2007, "Sensodyne Pronamel Toothpaste Sensodyne Enamel-Pro Toothpaste," Safeguarding Public Health, MHRA.

Ariely et al., 1966, "Synthesis of Poly-L-Arginine," Biopolymers 4(1):91-96.

(Continued)

Primary Examiner — Lezah Roberts

(57) **ABSTRACT**

Disclosed are anti-erosion oral care formulations and methods that provide erosion protection while maintaining adequate cleaning performance. The anti-erosion oral care formulations include a copolymer of a methylvinyl ether and a maleic anhydride and a metal compound or salt that becomes more soluble at acidic pH.

4 Claims, No Drawings