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(56) **References Cited**

U.S. PATENT DOCUMENTS

3,955,926 A * 5/1976 Fischer G01N 31/22 422/420
3,996,053 A * 12/1976 Martin G03C 1/725 430/374
4,337,065 A * 6/1982 Hiratsuka G01N 33/54386 422/423
4,668,359 A * 5/1987 Postle G01N 27/44747 106/205.71
4,833,088 A * 5/1989 DeSimone G01N 33/521 422/404
4,934,817 A * 6/1990 Gassenhuber G01N 33/92 356/244
5,073,629 A * 12/1991 Dubler G01N 33/533 436/536
5,158,849 A * 10/1992 Katsen C09D 5/24 430/58.1
5,212,099 A * 5/1993 Marcus G01N 21/1717 250/458.1
5,445,967 A * 8/1995 Deuter G06K 7/10851 235/462.25
5,526,120 A * 6/1996 Jina G01N 21/8483 356/244
6,159,424 A * 12/2000 Kauhaniemi A61B 5/150022 422/63
6,295,506 B1 * 9/2001 Heinonen A61B 5/14532 600/301
6,306,283 B1 * 10/2001 Brandt G01N 27/4166 205/775
7,267,799 B1 * 9/2007 Borich G01N 21/8483 235/462.11
7,283,245 B2 * 10/2007 Xiao G01N 21/253 356/434
7,420,663 B2 * 9/2008 Wang G01J 3/02 356/326
8,145,431 B2 * 3/2012 Kloepfer G01N 21/78 340/539.12
8,163,241 B2 * 4/2012 Burke G01N 21/645 204/400
8,367,013 B2 * 2/2013 Kaylor G01N 33/558 422/400
8,493,441 B2 * 7/2013 Thonhauser G01N 21/251 348/135
8,743,194 B2 * 6/2014 Fletcher G02B 21/0008 348/61
8,885,161 B2 * 11/2014 Scheeline G01J 3/42 356/328
8,889,424 B2 * 11/2014 Ehrenkranz G01N 33/78 422/425
8,916,390 B2 * 12/2014 Ozcan G01N 21/645 436/518
8,947,656 B2 * 2/2015 Cunningham G01J 3/28 356/300
9,023,295 B2 * 5/2015 Chumanov G01J 3/0291 422/561
9,057,702 B2 * 6/2015 Ozcan G01N 21/6486
9,241,663 B2 * 1/2016 Jena G01N 21/8483
9,244,066 B2 * 1/2016 O'Driscoll G01J 3/0202
9,445,749 B2 * 9/2016 Erickson G01N 33/52
9,489,703 B2 * 11/2016 Kauniskangas G06Q 50/22
2002/0058301 A1 * 5/2002 Huh C12Q 1/34 435/40.5
2003/0032077 A1 * 2/2003 Itoh A61B 5/0002 435/14
2003/0119202 A1 * 6/2003 Kaylor G01N 21/8483 436/514
2003/0151735 A1 * 8/2003 Blumenfeld G01N 21/6428 356/73
2005/0001144 A1 * 1/2005 Cartlidge G02B 21/0008 250/208.1
2005/0023439 A1 * 2/2005 Cartlidge G02B 27/0012 250/208.1
2005/0123439 A1 * 6/2005 Patton G01N 33/525 422/400
2005/0157304 A1 * 7/2005 Xiao G01N 21/253 356/446
2005/0201898 A1 * 9/2005 Borich G01N 21/78 422/82.05
2006/0222567 A1 * 10/2006 Kloepfer G01N 21/78 422/68.1
2006/0279732 A1 12/2006 Wang et al.
2007/0275472 A1 * 11/2007 Bertucci G01N 21/78 436/80
2008/0088918 A1 * 4/2008 O'Connell G02B 21/365 359/371
2008/0101986 A1 5/2008 Saini et al.
2009/0191092 A1 * 7/2009 Burke G01N 21/645 422/52
2010/0285610 A1 * 11/2010 Saul G01N 33/558 436/501
2011/0009163 A1 1/2011 Fletcher et al.
2011/0053283 A1 * 3/2011 Hood G01N 33/14 436/104
2011/0054938 A1 * 3/2011 Hood G01N 33/14 705/3
2011/0063433 A1 * 3/2011 Thonhauser G01N 21/251 348/135
2012/0002852 A1 * 1/2012 Karasikov G06K 9/00127 382/128
2012/0157160 A1 6/2012 Ozcan et al.
2012/0286046 A1 * 11/2012 Ciurczak G01J 3/0262 235/454
2012/0301528 A1 * 11/2012 Uhlmann A01N 59/16 424/405
2013/0093936 A1 * 4/2013 Scheeline G01J 3/42 348/345
2013/0157351 A1 * 6/2013 Ozcan G01N 21/6486 435/288.7
2013/0203043 A1 * 8/2013 Ozcan G06F 19/3487 435/5
2014/0002820 A1 * 1/2014 Ko G01J 3/0256 356/328
2014/0038222 A1 * 2/2014 Alt G01N 21/63 435/29
2014/0072189 A1 * 3/2014 Jena G01N 21/8483 382/128
2014/0154152 A1 * 6/2014 Chumanov G01J 3/0291 422/561
2014/0193839 A1 * 7/2014 Cunningham G01J 3/44 435/7.92
2014/0247340 A1 * 9/2014 Kauniskangas G06Q 50/22 348/92
2014/0296112 A1 * 10/2014 O'Driscoll G01J 3/0202 506/39
2014/0356978 A1 * 12/2014 Jabour G01N 33/54366 436/501
2015/0359458 A1 * 12/2015 Erickson G01N 33/52 455/557
2016/0077091 A1 * 3/2016 Tyrrell G01N 33/48792 436/501

OTHER PUBLICATIONS

Araki, H. et al, Inorganic Chemistry 2005, 44, 9667-9675.*
Crisp, S. et al, Analyst 1981, 106, 1318-1325.*
Abdel-Gawad, *Spectrophotometric determination of some pharmaceutical piperazine derivatives through charge-transfer and ion-*