

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 September 2007 (13.09.2007)

PCT

(10) International Publication Number
WO 2007/103105 A3

(51) International Patent Classification:
C07D 489/08 (2006.01)

(21) International Application Number:
PCT/US2007/005256

(22) International Filing Date: 2 March 2007 (02.03.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/778,258 2 March 2006 (02.03.2006) US

(71) Applicant (for all designated States except US):
MALLINCKRODT INC. [US/US]; 675 McDonnell
Boulevard, P.O. Box 5840, St. Louis, Missouri 63134
(US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BUEHLER, Henry, J.** [US/US]; 6916 Lake Park Circle, St. Louis, Missouri 63123 (US). **DUMMITT, William, E.** [US/US]; 8564 Big Bend Blvd., St. Louis, Missouri 63119 (US). **MANNINO, Anthony** [US/US]; 11465 Pineview Crossing, Maryland Heights, Missouri 63043 (US). **AUBUCHON, Dennis, C.** [US/US]; 3850 Autumnset, Arnold, Missouri 63010 (US). **GU, Hong** [US/US]; 345 Lugano Way, Oak Park, California 91377 (US).

(74) Agents: **COOKE, Christine, R.** et al.; Mallinckrodt Inc.,
675 McDonnell Boulevard, P.O. Box 5840, St. Louis, Mis-
souri 63134 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS,
JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS,
LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ,
NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU,
SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,
PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

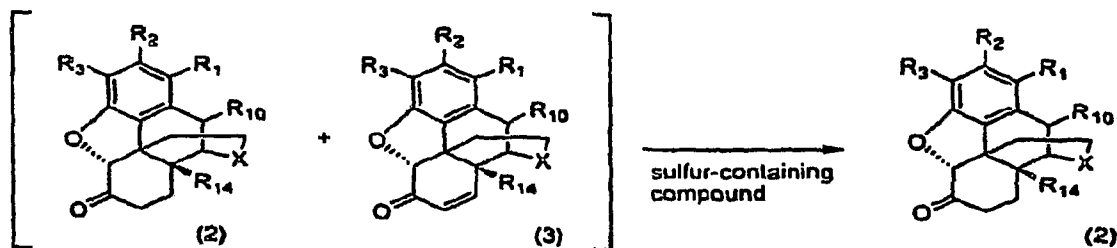
Published:

— with international search report

(88) Date of publication of the international search report:
22 November 2007

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: PROCESSES FOR PREPARING MORPHINAN-6-ONE PRODUCTS WITH LOW LEVELS OF ALPHA, BETA-UN-
SATURATED KETONE COMPOUNDS



(A)

(57) Abstract: The present invention generally relates to processes for preparing highly pure morphinan-6-one products. The pro-
cesses involve reducing the concentration of α,β -unsaturated ketone compounds present as impurities in morphinan 6 one products
or reaction mixtures including morphinan 6 one compounds by treatment with a sulfur-containing compound. (A)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/005256

A. CLASSIFICATION OF SUBJECT MATTER INV. C07D489/08		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) C07D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, BEILSTEIN Data, CHEM ABS Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 177 567 B1 (CHIU FANG-TING [US] ET AL) 23 January 2001 (2001-01-23) cited in the application example 5	1-50
A	----- IIJIMA I ET AL: "Studies in the (+)-morphinan series. 5. Synthesis and biological properties of (+)-Naloxone" JOURNAL OF MEDICINAL CHEMISTRY, vol. 21, 1978, pages 398-400, XP002446243 page 399 under '(+)-14-Hydroxydihydrocodeinone' -----	1-50
A	WO 2005/097801 A (EURO CELTIQUE SA [LU]; CHAPMAN ROBERT [US]; RIDER LONN S [US]; HONG QI) 20 October 2005 (2005-10-20) claim 1 ----- -/--	1-50
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *8* document member of the same patent family		
Date of the actual completion of the international search 13 August 2007		Date of mailing of the international search report 27/08/2007
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Bakboord, Joan

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/005256

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	WO 2006/084389 A (CILAG LTD [CH]; WEIGL ULRICH [DE]; KOETZ ULF [DE]; FREIFELD ILIA [CH]) 17 August 2006 (2006-08-17) claim 1 -----	1-50
P,A	WO 2006/094672 A (EURO CELTIQUE SA [LU]; KUPPER ROBERT J [US]) 14 September 2006 (2006-09-14) claim 1 -----	1-50

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/005256

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6177567	B1	23-01-2001	AU 7384400 A	30-04-2001
			AU 7743700 A	30-04-2001
			CA 2387523 A1	26-04-2001
			EP 1638975 A2	29-03-2006
			JP 2004502637 T	29-01-2004
			MX PA02003594 A	23-05-2003
			WO 0129047 A2	26-04-2001
			WO 0129048 A2	26-04-2001
			US 6262266 B1	17-07-2001
WO 2005097801	A	20-10-2005	AR 049012 A1	21-06-2006
			AU 2005230826 A1	20-10-2005
			CA 2557845 A1	20-10-2005
			EP 1730151 A1	13-12-2006
WO 2006084389	A	17-08-2006	WO 2006084412 A1	17-08-2006
WO 2006094672	A	14-09-2006	NONE	