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6 December 2012

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(54) Title: METHODS AND COMPOUNDS FOR PREPARING 3ALPHA-OXYGEN SUBSTITUTED STEROIDS

(57) Abstract: The invention relates to processes for preparing 3α-O-linked steroids including 3α-O-linked-androst-5-ene steroids and 3α-O-linked-5α-androstane steroids. In one process a 3α,4α-epoxy androst-5-en-17-one is predominately reduced at the epoxy moiety wherein reduction of the 3α,4α epoxy functional group occurs preferentially at position C4 with retention of configuration at position C3 to provide a 3α-O-linked-androst-5-ene steroid. In another process, conditions are provided for inversion of configuration of a 3β-hydroxy-androst-5-ene steroid by the Mitsunobu reaction to provide a 3α-O-linked-androst-5-ene steroid with reduced amounts of 3α,5α-cycloandrostane side-product impurities.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/65298

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61K 31/56 (2012.01)
USPC - 514/177
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)
USPC - 514/177

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 514/169; 514/175; 514/178; 514/182; 540/115; 546/61 (see search terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
USPTO-WEST - PGPB,USPT,USOC,EPAB,JPAB keywords: ethynylandrost-5-ene, ethynylandrostane, 7,17-dione, acetylide, DHEA, Hollis-Eden, epoxidation, reduction, m-chloroperoxybenzoic acid, NaBH4, epoxides, reductive, ring opening, regioselective, catalytic hydrogenation, Pd/C, androst-5-ene-7-one, TMS-acetylene, n-BuLi, androstane, Mitsunobu reaction. IN

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008/0153792 A1 (FRINCKE et al.) 26 June 2008 (26.06.2008) para [0002], [0027], [0032], [0035], [0037], [0041], [0124]-[0125], [0132], [0137]-[0138], [0230], step IV; [0240], [0247], [0249], see step V; [0253]	1-34 and 36-50
Y	MA et al. Epoxidation and Reduction of DHEA, 1,4,6-Androstatrien-3-one and 4,6-Androstadien-3beta,17beta-diol. Molecules, 2005, Vol 10, pp 572-582; pg 574, Scheme 1, see cpds 2, 4 and 10	1-34 and 36-50
Y	BONINI et al. Synthesis and elaboration of trans 2,3-diaryloxiranes. ARKIVOC, 2008, (viii), pp 150-182; pg 163 - pg 164, see Scheme 11 Downloaded at http://www.arkat-usa.org/get-file/23144/	9-34 and 36-50
Y	US 7,842,680 B2 (LARDY et al.) 30 November 2010 (30.11.2010) col 2, ln 27-30; col 2, ln 37-col 3, ln 67	17, 22-26, 33-34, 36-39 and 47
Y	US 2009/0326251 A1 (WHITE et al.) 31 December 2009 (31.12.2009) para [0046], step 2; [0052], step 8	28, 34 and 49-50
Y	WO 02/089814 A1 (MONTI et al.) 14 November 2002 (14.11.2002) pg 8, Scheme 1, step e; pg 11, ln 11-23	40-50

☐ Further documents are listed in the continuation of Box C. ☐

* 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 application or patent but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed
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"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774