PS (Pharmaceutical Substances)

Subject Coverage

- Marketed Active Pharmaceutical Ingredients
- Preparation Methods for Pharmaceutical Substances

File Type

Substance

Features

Thesaurus	None				
Alerts (SDIs)	Not available				
CAS Registry Number® Identifiers	☑	Page Images	☐	STN® AnaVist™	☐
Keep & Share	☑	SLART	☑	STN Easy®	☐
Learning Database	☐	Structures	☐		

Record Content

- Records contain essential information, trade data and preparation methods for active pharmaceutical ingredients.
- For indexed pharmaceutical substances ATC, therapeutic use, chemical name, molecular formula, CAS Registry Number, EINECS Number, lethal dose, information on derivatives, and substance class are given.
- Furthermore are formulations, trade names and vendors, and an overview of intermediates from the compounds preparations present.
- Reaction schemes for industrial synthesis, can be displayed as TIFF-images.
- The reactants and products are structure-searchable with a single reaction query. Roles are also structure-searchable.

File Size

- Pharmaceutical ingredients launched from 1957 - 2009
- 2.460 pharmaceutical substances

Coverage

1957-Dec 2009

Updates

Static File

Language

English

Database Producer

Georg Thieme Verlag
Thieme Chemistry
Rüdigerstrasse 14
70469 Stuttgart
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Copyright Holder

Database Supplier	FIZ Karlsruhe STN Europe P.O. Box 2465 76012 Karlsruhe Germany Phone: +49-7247-808-555 Fax: +49-7247-808-259 Email: helpdesk@fiz-karlsruhe.de
Sources	• The U.S. Food and Drug Administration (FDA) • ATC Index from the WHO • Patents • Publications and databases in the field of organic chemistry
User Aids	• Online Helps (HELP DIRECTORY lists all help messages available) • STNGUIDE
Clusters	• BIOSCIENCE • CASRNS • COMPANIES • CORPSOURCE • HPATETS • PATENTS • PHARMACOLOGY • REACTIONS • STRUCTURE • STN Database Clusters information (PDF)
Pricing	Enter HELP COST at an arrow prompt.

Search and Display Field Codes

Fields that allow left truncation are indicated by an asterisk (*).

General Search Fields

Search Field Name	Search Code	Search Examples	Display Codes
Basic Index* (contains single words from the fields CC, CN, CN.DRV, CN.INT, CO, DEF, EIN, EIN.DRV, MF, MF.DRV, MF.INT, PRE.COND, RN, RN.DRV, RN.INT, THER, TN) **(1)**	None or /BI	S CODEINE/BI S 60-00-4 S C10H11NO3	CN, DEF,DRV, EIN, INT, MF, RN, TRD
Accession Number	/AN	S 265009/AN	AN
Application Date **(2)**	/AD	S 19990101-20001231/AD	RE
ATC Code	/CC	S A01?/CC	CC
Author	/AU	S 265009/AN	RE
CAS Registry Number	/RN	S 40054-69-1/RN	RN
Chemical Name Segment **(1)**	/CNS	S KETOPROFEN/CNS	CN
Chemical Name **(3)**	/CN	S DIAZEPAM/CN	CN
Corporate Name (Manufacturer) **(4)**	/CO	S KNOLL?/CO	TRD
Data Entry Date **(2)**	/DED	S DED>2000	DED
Definition (Compound Class)	/DEF	S TYROSINES/DEF	DEF
Derivative CAS Registry Number	/RN.DRV	S 50832-74-1/RN.DRV	DRV
Derivative Chemical Name	/CN.DRV	S CALCIUM SALT/CN.DRV	DRV
Derivative EINECS Number	/EIN.DRV	S 200-055-2/EIN.DRV	DRV
Derivative Lethal Dose	/LD50.DRV	S 100 MG/KG ?/LD50.DRV	DRV
Derivative Molecular Formula	/MF.DRV	S C5H8NNAO3S/MF.DRV	DRV
Derivative Molecular Weight **(2)**	/MW.DRV	S 150-160/MW.DRV	DRV
Document Type	/DT	S PATENT/DT	not displayed
EINECS Number	/EIN	S 200-014-9/EIN	EIN
Entry Date **(2)**	/ED	S 2009?/ED	ED
Field Availability **(5)**	/FA	S FORMULATION/FA	not displayed
Formulation	/FRM	S AEROSOL?/FRM	FRM
Intermediate CAS Registry Number	/RN.INT	S 104-85-8/RN.INT	INT
Intermediate Chemical Name	/CN.INT	S ABIETIC ACID/CN.INT	INT
Intermediate Chemical Name Segment	/CNS.INT	S ACETALDEHYDE/CNS.INT	INT
Intermediate Molecular Formula	/MF.INT	S C20H12O8/MF.INT	INT
International Standard (Document) Number (CODEN)	/ISN	S JACSAT/ISN	RE
Journal Title	/JT	S J BIOL CHEM/JT	RE
Launch Country Code (ISO code and text)	/LNC	S GB/LNC	TRD
Launch Year **(2)**	/LNY	S 2000-2001/LNY	TRD
Lethal Dose	/LD50	S 1 G/KG ?/LD50	LD50
Molecular Formula	/MF	S C22H30N6O4S/MF	MF
Molecular Weight **(2)**	/MW (or /FW)	S MW>500	MW
Patent Assignee **(4)**	/PA (or /CS)	S HOECHST?/PA	RE
Patent Country (WIPO code and text)	/PC	S DE/PC	RE
Patent Number	/PN	S DE2004686/PN	RE
Preparation Conditions	/PRE.COND	S STREPTOMYCES/PRE.COND	not displayed

General Search Fields (cont'd)

Search Field Name	Search Code	Search Examples	Display Codes
Priority Country (WIPO code and text)	/PRC	S WO/PRC	RE
Priority Date **(2)**	/PRD	S PRD>20010000	RE
Publication Date **(2)**	/PD	S 20020000-20021231/PD	RE
Publication Year **(2)**	/PY	S 2000-2001/PY	RE
Reference (contains single terms from the fields: Author, CODEN, Journal Title, Patent Assignee, Patent Country, Publication Date, Patent Number, Priority Country, Priority Date, and Publication Year)	/RE	S BASF/RE	RE
Status	/STA	S WFM/STA	TRD
Therapeutic Use	/THER	S ANTIALLERGIC/THER	THER
Trade Name	/TN	S DIANE 35/TN	TRD

(1) In addition to right truncation, left and simultaneous left and right truncation are available in this fields. At least 4 characters need to be used for the length of the stem.
(2) Numeric search field which may be searched with numeric operators or ranges.
(3) CN search field contains Generic Names, Synonyms, Systematic Names, and Trade Names.
(4) Search with implied (S) proximity is available in this field.
(5) Searching for all information available in each display field.

Structure Search Terms

Terms 1)	Search Examples
L-numbers of structures built using the STRUCTURE command or uploaded from STN Express (Boolean logic allowed between the L-numbers)	S L1 SSS
L-numbers of screen sets created using the SCREEN command (Boolean logic allowed between the L-numbers)	S L3 OR L4 SSS
L-numbers of structures built using the STRUCTURE command or uploaded from STN Express combined with L-numbers of screen sets created using the SCREEN command (Boolean logic allowed between the L-numbers)	S L1 AND L2 NOT L3

(1) The L-number answer set from a structure search may be combined with text terms, e.g., 'S L6 AND ANTIALLERGIC/THER'.

Types of Structure Searching

Type	Definition	Search Code	Search Examples
Closed Substructure	Search for substances that match the query exactly. Substitution is allowed at positions opened by CONNECT. Additional components may be retrieved.	CSS	SEARCH L1 CSS FULL SEA L5 CSS S L5 CSS
Substructure (default)	Search for substances that match the query. Substitution is allowed at all open position. Additional components may be retrieved.	SSS	SEARCH L1 SSS FULL SEA l4 SSS S L1 SSS

Scopes of Structure Searching

Scope	Definition	Search Code	Search Examples
FULL (default)	Search 100 % of the file.	FUL	S L2 SSS FUL
Subset FULL	Search 100 % of an answer set created by the search in PS.	SUB FUL	S L8 SUB=L6 CSS FUL

DISPLAY and PRINT Formats

Any combination of codes may be used to display or print answers. Multiple codes must be separated by spaces or commas, e.g., D L1 1-5 FRM, TRD. The fields are displayed or printed in the order requested. Hit-term highlighting is available in AN, CC, CN, DED, DEF, DRV, EIN, ED, FRM, LD50, MF, MW, RN, and THER.
Highlighting must be ON during SEARCH to use the HIT, and OCC formats.

Format	Content	Examples
AN	Accession Number	DISPLAY L2 1-10 AN
CC	Classification Code	D CC
CN	Chemical Name	DISPLAY CN 1-5
DED	Data Entry Date	D DED
DEF	Definition (Compound Class)	D DEF
DRV (CN.DRV, EIN.DRV, LD50.DRV, MF.DRV, MW.DRV,RN.DRV)	Derivative	DIS DRV L2 1
EIN	EINECS Number	D EIN
ED **(1)**	Entry Date	D ED
FRM	Formulation	D FRM
GI (PRE) **(2)**	Graphical Image (Preparation(s))	D GI L9 1-5
INT (CN.INT, MF.INT, RN.INT)	Intermediate(s)	D INT
LD50	Lethal Dose	DIS LD50
MF	Molecular Formula	D MF
MW	Molecular Weight	D MW
RE	Reference	D REF L5 1
RN	CAS Registry Number	DIS RN
THER	Therapeutic Use	D THER
TRD (CO, LNC, LNY,SRA, TN)	Trade Data	D TRD L3 1c
ALL	AN, IDE, DRV, TRD, FRM, PRED	D L2 1 ALL
IALL	ALL, indented with text labels	D IALL
IDE	DED, CN, TN, CC, THER, RN, MF, MW, EIN, LD50, DEF	DIS IDE L2 1-10
IIDE	IDE, indented with text labels	D IIDE
IPRED	PRED, indented with text labels	DIS IPRED
ISTD	STD, indented with text labels	DISPLAY ISTD L8 1
PRED (GID)	GI, INT, RE	DIS PRED L4
STD	IDE, DRV, TRD, RE	DISPLAY L1 STD 1-5
SCAN **(3)**	CN (Generic Name), CC (display with no answer number)	D SCAN
HIT **(4)**	Hit term(s) and field(s)	D HIT
KWIC	Up to 50 words before and after hit term(s) (KeyWord-In-Context)	D KWIC
OCC	Number of occurrences of hit term(s) and field(s) in which they occur	D OCC

(1) Custom display only.
(2) You can use the GI format in the DISPLAY command for the images of all available synthesis paths for a title substance. Any program that handles TIFF images compressed in Group 4 fax format, e.g., STN Express, may be used to capture the graphic images.
(3) SCAN must be specified on the command line, i.e., D SCAN or DISPLAY SCAN.
(4) The HIT display can not be used after a structure search. In order to display reactions after a structure search use the display format GI (alias PRE).

SELECT, ANALYZE, and SORT Fields

The SELECT command is used to create E-numbers containing terms taken from the specified field in an answer set.

The ANALYZE command is used to create an L-number containing terms taken from the specified field in an answer set.

The SORT command is used to rearrange the search results in either alphabetic or numeric order of the specified field(s).

Field Name	Field Code	ANALYZE/ SELECT (1)	SORT
Accession Number	AN	Y	N
ATC Code	CC	Y	Y
Author	AU	Y **(2)**	N
CAS Registry Number	RN	Y	Y
Chemical Name	CN	Y **(3)**	N
Corporate Name (Manufacturer)	CO	Y **(2)**	N
Data Entry Date	DED	Y	Y
Definition (Compound Class)	DEF	Y	N
Derivative CAS Registry Number	RN.DRV	Y **(5)**	N
EINECS Number	EIN	Y	Y
Intermediate CAS Registry Number	RN.INT	Y **(2,5)**	N
Intermediate Chemical Name	CNT	Y **(2,4)**	N
Molecular Formula	MF	Y	Y
Molecular Weight	MW	Y	Y
Patent Assignee	PA	Y **(2)**	N
Patent Number	PN	Y **(2)**	N
Therapeutic Use	THER	Y	Y
Trade Name	TN	Y **(2)**	N

(1) Hit may be used to restrict extracted terms to terms that match the search expression used to create the answer set, e.g., SEL HIT TI.
(2) SELECT HIT or ANALYZE HIT are not valid with this field.
(3) Selects or analyzes the Generic Names, Synonyms, Systematic Names, and Trade Names of the title compounds with /CN appended to the terms created by SELECT.
(4) Appends /CN to the terms created by SELECT.
(5) Appends /RN to the terms created by SELECT.

Sample Records

DISPLAY IALL

Accession Number	266535
Data Entry Date	20080731
Chemical Name	GENERIC: Levothyroxine
Chemical Name	SYSTEMATIC: O-(4-hydroxy-3,5-diiodophenyl)-3,5-diiodo-l-tyrosine
Trade Name	Berlthyrox; Euthyrox; Thevier; L-Thyroxin 'Henning'; numerous combination preparations; Euthyral; Levothyrox; L-Thyroxine Roche; Eltroxine; Tiroide; Tirosint; Thyradin; Levothroid; Levoxyl; Naturethroid; Synthroid; Westhroid
ATC Code	H03AA01
Therapeutic Use(s)	thyroid hormone
CAS Registry Number	51-48-9
Molecular Formula	C15H11I4NO4
Molecular Weight	776.87
EINECS Number	200-101-1
Definition (Compound Class)	Iodohydroxyphenylcarboxylic acids, Iodohydroxyphenoxyphenylcarboxylic acids and esters
Definition (Compound Class)	Tyrosines
Derivative — Chemical Name	monosodium salt
Derivative — CAS Registry Number	55-03-8
Derivative — Molecular Formula	C15H10I4NNaO4
Derivative — Molecular Weight	798.85
Derivative — EINECS Number	200-221-4
Derivative — LD50	20 mg/kg (R, i.p.); 50 mg/kg (R, s.c.)

Trade Data

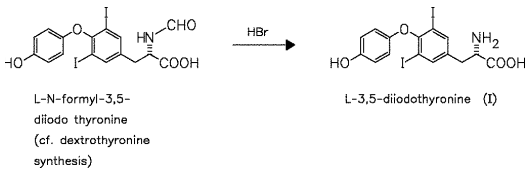
Launch Country	Trade Name	Company Name (Manufacturer)	Comment	
DE	Berlthyrox	Berlin-Chemie		
DE	Euthyrox	Merck		<--
DE	Thevier	GlaxoSmithKline		
DE	L-Thyroxin 'Henning"	Henning Berlin		
DE	numerous combination preparations			
FR	Euthyral	Merck Lipha		
FR	Levothyrox	Merck Lipha		
FR	L-Thyroxine Roche	Roche		
GB	Eltroxine	Goldshield		
IT	Tiroide	Amsa	comb.	
IT	Tirosint	Amsa		
JP	Thyradin	Aska		
US	Levothroid	Forest	as sodium salt	
US	Levoxyl	King		
US	Naturethroid	Western Research Labs.		
US	Synthroid	Abbott	as sodium salt	

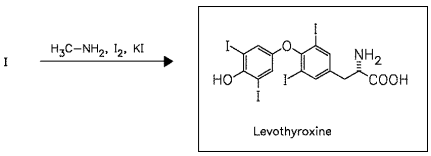
PS

US |Westhroid |Western Research Labs.| |

Formulation(s) powder 0.1 mg; tabl. 0.025 mg, 0.05 mg, 0.075 mg, 0.1 mg, 0.125 mg, 0.150 mg, 0.175 mg, 0.2 mg, 0.3 mg (as sodium salt)

Preparation(s)





Intermediate(s) in Substance Preparation

Molecular Formula	Chemical Name
C16H13I2NO5	l-N-formyl-3,5-diiodothyronine

Reference(s)

(1) Nahm, H.; Siedel, W.: Chem. Ber. (CHBEAM) 96, 1 (1963).
(2) DE 1 067 826 (Hoechst; appl. 1955).
alternative syntheses from l-tyrosine via l-N-acetyl-3,5-diiodotyrosine ethyl ester:
(3) DE 1 077 673 (Hoechst; appl. 1958).
(4) DE 1 064 529 (G. Hillmann; appl. 1956).
(5) DE 1 065 855 (G. Hillmann; appl. 1956).
(6) US 2 803 654 (Baxter Labs.; 1957; prior. 1953).
(7) US 2 889 363 (Baxter Labs.; 1959; appl. 1955).
(8) US 2 889 364 (Baxter Labs.; 1959; appl. 1957).

DISPLAY STD

AN 268308
DED 20080731
CN GENERIC: Atorvastatin calcium
CN SYNONYM: CI-981; YM-548
CN SYSTEMATIC: [R-(R*,R*)]-2-(4-fluorophenyl)-β,δ-dihydroxy-5-(1-methylethyl)-3-phenyl-4-[(phenylamino)carbonyl]-1H-pyrrole-1-heptanoic acid calcium salt (2:1)
TN Sortis; Caduet; Tahor; Lipitor; Lipitor; Torvast; Totalip; Lipitor;

```
          Lipitor
CC        C10AA05
THER      hypolipidemic, HMG-CoA-reductase inhibitor
RN        134523-03-8
MF        C66H68CaF2N4O10
MW        1155.36

DEF       Anilides
DEF       Fluorocarboxylic acids
DEF       Heptanoic and Heptenoic acids
DEF       Hydroxy acids
DEF       Pyrroles
DRV  CN.DRV    free acid
     RN.DRV    134523-00-5
     MF.DRV    C33H35FN2O5
     MW.DRV    558.65
```

TRD

LNY	LNC	TN	CO	STA	COM	
	DE	Sortis	Parke Davis			<--
	FR	Caduet	Pfizer		comb.	
	FR	Tahor	Pfizer			
	GB	Lipitor	Pfizer			
	IT	Lipitor	Warner-Lambert			
	IT	Torvast	Pfizer			
	IT	Totalip	Guidotti			
	JP	Lipitor	Astellas			
	US	Lipitor	Parke Davis			

RE

(1) US 4 681 893 (Warner-Lambert; 21.7.1987; appl. 30.5.1986).
(2) US 5 273 995 (Warner-Lambert; 28.12.1993; appl. 26.2.1991; USA-prior. 21.7.1989).
(3) EP 409 281 (Warner-Lambert; appl. 23.1.1991; USA-prior. 21.7.1989, 26.2.1991).
review:
(4) DE 1 061 073 (Warner-Lambert; appl. 20.7.1990; USA-prior. 21.7.1989).
(5) Roth, B.D. et al.: J. Med. Chem. (JMCMAR) 34, 357-366 (1991).
(6) Nanninga, T. et al.: Tetrahedron Lett. (TELEAY) 33, 2279-2282 (1992).
(7) Li, J.J.; Johnson, D.S.; Sliskovic, D.R.; Roth, B.D.: Contemporary Drug Synthesis, Wiley-Interscience , 113-124 (2004).
(8) a1 US 4 647 576 (Warner-Lambert; 3.3.1987; appl. 10.12.1984; USA-prior. 24.9.1984).
(9) US 5 124 482 (Warner-Lambert; 23.6.1992; appl. 14.11.1991; USA-prior. 22.2.1988, 1.2.1989, 9.10.1990).
alternative synthesis of intermediate I:
(10) US 5 149 837 (Warner-Lambert; 22.9.1992; appl. 12.2.1992; USA-prior. 22.2.1988, 1.2.1989, 9.10.1990, 14.11.1991).
(11) WO 2 003 004 457 (Ciba specialty Chemicals; appl. 25.6.2002; EP-prior. 4.7.2001).
improved process:
(12) a2a3 US 5 273 995 (Warner-Lambert; 28.12.1993; appl. 26.2.1991; USA-prior. 21.7.1989).
(13) WO 2 005 087 723 (Apotex Pharmachem; appl. 11.3.2005; CA-prior. 15.3.2004).

(14) CA 2 460 935 (Apotex Pharmachem; appl. 15.3.2004).
(15) a4 US 4 681 893 (Warner-Lambert; appl. 21.7.1987; USA-prior. 30.5.1986).
(16) bc1 US 5 155 251 (Warner-Lambert; 13.10.1992; appl. 11.10.1991).
(17) c1 US 5 103 024 (Warner-Lambert; 7.4.1992; appl. 17.10.1990).
(18) US 6 433 213 (Warner-Lambert; 13.8.2002; appl. 2.12.1998, 16.6.2000; USA-prior. 19.12.1997).
(19) US 6 596 879 (Warner-Lambert; 22.7.2003; appl. 11.6.2002; USA-prior. 19.12.1997, 2.12.1998).
(20) US 6 962 994 (Warner-Lambert; 8.11.2005; appl. 11.4.2003; USA-prior. 19.12.1997, 11.6.2002).

(S)-3,4-dihydroxybutanoic acid and (S)-3-hydroxybutyrolactone from carbohydrates (e.g. maltose, lactose):

(21) c2 US 5 248 793 (Warner-Lambert; 28.9.1993; appl. 21.12.1992; USA-prior. 17.10.1990, 27.12.1991).
(22) d1 US 5 292 939 (Hollingsworth, R.I., Michigan State University; 8.3.1994; appl. 26.10.1992; USA-prior. 13.5.1991).
(23) US 5 319 110 (Hollingsworth, R.I., Michigan State University; 7.6.1994; appl. 26.10.1992; USA-prior. 13.5.1991).
(24) US 5 374 773 (Hollingsworth, R.I., Michigan State University; 20.12.1994; appl. 27.10.1993; USA-prior. 13.5.1991, 26.10.1992).
(25) US 6 239 311 (Hollingsworth, R.I., Michigan State University; 29.5.2001; appl. 24.4.2000).

or from amylopektin after enzymatic treatment with α-amylase and pullulanase:

(26) US 5 998 633 (Warner-Lambert; 7.12.1999; appl. 1.7.1997; USA-prior. 29.7.1996).
(27) US 6 124 122 (Samsung FineChem.; 26.9.2000; appl. 23.7.1999; KR-prior. 24.7.1998).
(28) US 6 221 639 (Samsung FineChem.; 24.4.2001; appl. 23.7.1999; KR-prior. 24.7.1998).
(29) US 6 251 642 (Samsung FineChem.; 26.6.2001; appl. 23.7.1999; KR-prior. 24.7.1998).

continous process:

(30) US 6 713 290 (Samsung FineChem.; 30.3.2004; appl. 6.9.2001; KR-prior. 24.7.2001).
(31) US 6 288 272 (Samsung FineChem.; 11.9.2001; appl. 23.7.1999; KR-prior. 24.7.1998).
(32) d2 US 4 994 597 (Kanegafuchi; 19.2.1991; appl. 27.4.1989; J-prior. 27.4.1988).

[chemoenzymatic syntheses of biulding blocks for statin side chains]
chemoenzymatic synthesis of the lactole side chain by condensation of acetaldehyde with chloroacetaldehyde or cyanoacetaldehyde or 3-azidopropionaldehyde in presence of novel aldolases and converting into the aminoethyllactone:

(33) d3 Mueller, M.: Angew. Chem. Int. Ed. (ACIEF5) 44, 362-365 (2005).

alternative syntheses routes - 1,6-heptadien-4-ol as educt for side chain:

(34) WO 2 004 027 075 (Diversa; appl. 19.8.2003; USA-prior. 20.9.2002, 9.5.2003).
(35) US 5 003 080 (Warner-Lambert; 26.3.1991; appl. 1.2.1989; USA-prior. 22.2.1988).
(36) US 5 097 045 (Warner-Lambert; 17.3.1992; appl. 9.10.1990; USA-prior. 22.2.1988, 1.2.1989).
(37) US 5 124 482 (Warner-Lambert; 23.6.1992; appl. 14.11.1991; USA-prior. 22.2.1988, 1.2.1989, 9.10.1990).
(38) US 5 149 837 (Warner-Lambert; 22.9.1992; appl. 12.2.1992; USA-prior. 22.2.1988, 1.2.1989, 9.10.1990, 14.11.1991).
(39) US 5 216 174 (Warner-Lambert; 1.6.1993; appl. 1.6.1992; USA-prior. 22.2.1988, 1.2.1989, 9.10.1990, 14.11.1991, 12.2.1992).
(40) US 5 245 047 (Warner-Lambert; 14.9.1993; appl. 16.2.1993; USA-prior.

22.2.1988, 1.2.1989, 9.10.1990, 14.11.1991, 12.2.1992, 1.6.1992).
asymmetric hydrogenation of the diketo side chain with Ru-complexes:
(41) US 5 280 126 (Warner-Lambert; appl. 6.5.1993; USA-prior. 22.2.1988, 1.2.1989, 9.10.1990, 14.11.1991, 12.2.1992, 1.6.1992, 16.2.1993).
(42) US 6 476 235 (Warner-Lambert; 5.11.2002; appl. 17.12.2001; USA-prior. 9.1.2001).
(43) US 6 545 153 (Warner-Lambert; 8.4.2003; appl. 18.7.2002; USA-prior. 9.1.2001, 17.12.2001).
(44) US 6 933 393 (Warner-Lambert; 23.8.2005; appl. 21.1.2003; USA-prior. 9.1.2001, 17.12.2001, 18.7.2002).
condensation of I with aminoethyllactone:
(45) US 6 777 560 (Warner-Lambert; 17.8.2004; appl. 6.8.2003; USA-prior. 6.8.2002).
3,5-phenylboranatohexanoates as intermediates:
(46) WO 2 005 012 246 (Avecia Pharmaceutical; appl. 23.7.2004).
(47) WO 2 002 057 274 (Biocon; appl. 14.6.2001; IN-prior. 19.1.2001).
(48) WO 2 003 070 733 (Biocon; appl. 25.2.2002).
lactonisation process:
(49) WO 2 004 113 314 (Biocon; appl. 18.6.2004; IN-prior. 23.6.2003).
(50) US 6 417 374 (Council Sci. & Res. India; 9.7.2002; appl. 15.2.2001).
hydrolysis with calcium hydroxide:
(51) US 6 380 401 (Merck & Co.; 30.4.2002; appl. 23.10.2001).
crystalline forms of atorvastatin calcium:
(52) US 2 002 099 224 (E.Ishai; 25.7.2002; appl. 24.11.2001).
(53) US 5 959 156 (Warner-Lambert; 19.10.1999; appl. 29.9.1997; USA-prior. 17.7.1995).
(54) WO 9 703 959 (Warner-Lambert; appl. 8.7.1996; USA-prior. 17.7.1995).
(55) WO 9 703 958 (Warner-Lambert; appl. 6.2.1997; USA-prior. 17.7.1995).
crystalline forms I - IV of hemicalcium salt trihydrate:
(56) US 6 528 661 (Teva; 4.3.2003; appl. 24.10.2001; prior. 16.11.2000, 13.8.2001, 1.10.2001).
crystalline form III:
(57) US 5 969 156 (Warner-Lambert; 19.10.1999; appl. 29.9.1997).
crystalline forms V - XIX:
(58) US 6 121 461 (Warner-Lambert; 19.9.2000; appl. 8.7.1996, 26.7.1999; USA-prior. 17.7.1995).
factory process for cryst. atorvastatin trihydrate hemicalcium salt.
(59) US 6 605 729 (Warner-Lambert; 12.8.2003; appl. 28.6.2002; USA-prior. 29.6.2001).
production scale process for cryst. atorvastatin calcium:
(60) US 6 600 051 (Warner-Lambert; 29.7.2003; appl. 14.6.2002; IE-prior. 17.12.1999).
crystalline form VII:
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