



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/HU97/00047 (22) International Filing Date: 5 September 1997 (05.09.97) (30) Priority Data: P 96 02431 5 September 1996 (05.09.96) HU (71) Applicant (for all designated States except US): BAY ZOLTÁN ALKALMAZOTT KUTATÁSI ALAPÍTVÁNY [HU/HU]; Fehérvári út 130, H-1116 Budapest (HU). (72) Inventors; and (75) Inventors/Applicants (for US only): POLYÁK, Béla [HU/HU]; Budapesti krt. 2/b, H-6723 Szeged (HU). KÁLMÁN, Miklós [HU/HU]; Jakab Lajos u. 12/a, H-6723 Szeged (HU). KISS-TÓTH, Endre [HU/HU]; József Attila u. 14, H-6722 Deszk (HU). DORGAI, László [HU/HU]; Cankó u. 8, H-6726 Szeged (HU). TÓTH, Mária [HU/HU]; Építő út 11/a, H-6723 Szeged (HU). HANSEL, Miklós [HU/HU]; Damjanich u. 17, H-6724 Szeged (HU). BENJAMIN, Árpád [HU/HU]; Lomnici u. 30/b, H-6723 Szeged (HU). (74) Agent: DANUBIA; P.O. Box 198, H-1368 Budapest (HU).	(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims</i> <i>and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 23 April 1998 (23.04.98)	
(54) Title: METHOD AND IMMOBILIZED BIOCATALYST FOR THE PRODUCTION OF L(-) MALIC ACID		
(57) Abstract		
<p>Disclosed herein is a novel continuous production process for the preparation of L(-) malic acid (the naturally occurring enantiomer of malic acid) from fumaric acid with the use of a novel immobilized biocatalyst. The long shelf life novel immobilized biocatalyst comprising living or killed cells or purified enzymes suitable for use in the method of the invention is also comprised in the invention.</p>		

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INTERNATIONAL SEARCH REPORT

International Classification No
PCT/HU 97/00047

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 C12N11/04 C12P7/46

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)
 IPC 6 C12N

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 93 24112 A (CLOVER CONS LTD ;SOON SHIONG PATRICK (US); HEINTZ ROSWITH A (US)) 9 December 1993 see page 5, line 27 - page 8, line 7 see page 10, line 10 - page 17, line 23 see especially page 14, line 15 - page 15, line 2 ---	1,4-10
A	US 4 352 883 A (LIM FRANKLIN) 5 October 1982 see column 2, line 10 - column 3, line 13 see column 9; example 1 see column 10; example 5 --- -/--	3

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
22 January 1998	11/03/1998

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 Sitch, W
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	<p>DATABASE WPI Week 9744 Derwent Publications Ltd., London, GB; AN 97-474060 XP002052928 & HU 72 927 A (BAY ZOLTAN ALKALMAZOTT KUTATASI ALAPITVA) , 28 June 1996 cited in the application see abstract</p> <p style="text-align: center;">---</p>	4-6,8-10
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A	<p>DATABASE BIOSIS BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US ABSTRACT NO. 95:106627, WAKAO ET AL: "IMMOBILIZATION OF THIOBACILLUS FERROOXIDANS USING VARIOUS POLYMERS AS MATRIX" XP002052927 see abstract & JOURNAL OF GENERAL AND APPLIED MICROBIOLOGY, vol. 40, no. 4, 1994, pages 349-358,</p> <p style="text-align: center;">-----</p>	

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Information on patent family members

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