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ning of each regular issue of the PCT Gazette.*

(54) Title: TOTAL SYNTHESIS OF HEPARIN

(57) Abstract: The present invention provides for a total synthesis of heparin, including synthesis of the heparin precursor backbone oligosaccharide, deacetylation and N-sulfation of the heparin backbone, epimerization of the backbone, and O-sulfation of saccharide residues of the backbone.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/26349

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12N 1/21, 9/10, 15/31, 15/52, 15/54, 15/70

US CL : 435/320.1, 252.3, 252.8, 69.1, 193,

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 435/320.1, 252.3, 252.8, 69.1, 193,

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	RIGG et al., The localization of KpsC, S and T, and KfiA, C and D proteins involved in the biosynthesis of the Escherichia coli K5 capsular polysaccharide: evidence for a	1-38
---	membrane-bound complex, Microbiology, 1998, Vol. 144, pages 2905-2914, especially	39-56
A	Fig. 1 and page 2908, second column, last paragraph - page 2910, first column.	
Y	WO 98/11231 (THE ROCKEFELLER UNIVERSITY) 19 March 1998 (19.03.98), especially abstract, claims, SEQ. ID NO: 1.	1-38
Y	HODSON et al., Identification That KfiA, a Protein Essential for the Biosynthesis of the Escherichia coli K5 Capsular Polysaccharide Is an alpha-UDP-GlcNAc Glycosyltransferase, Journal of Biological Chemistry, September 2000, Vol. 275, No. 35, pages 27311-27315, especially abstract and page 27314.	1-38

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

☐ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
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"O" document referring to an oral disclosure, use, exhibition or other means	
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Continuation of B. FIELDS SEARCHED Item 3:

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