



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>6</sup>:</b><br><br><b>C07C 51/56</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 99/18061</b><br><br><b>(43) International Publication Date:</b> 15 April 1999 (15.04.99)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>(21) International Application Number:</b> PCT/NL98/00571<br><br><b>(22) International Filing Date:</b> 2 October 1998 (02.10.98)<br><br><b>(30) Priority Data:</b><br>08/946,055      7 October 1997 (07.10.97)      US<br><br><b>(71) Applicants (for all designated States except US):</b> DSM N.V. [NL/NL]; Het Overloon 1, NL-6411 TE Heerlen (NL). E.I. DU PONT DE NEMOURS AND COMPANY [US/US]; 1007 Market Street, Wilmington, DE 19898 (US).<br><br><b>(72) Inventor; and</b><br><b>(73) Inventor/Applicant (for US only):</b> BURKE, Patrick, Michael [US/US]; 4613 Tally Hill Lane, Wilmington, DE 19803 (US).<br><br><b>(74) Agent:</b> KLEIBORN, Paul, Erik; Octrooibureau DSM, P.O. Box 9, NL-6160 MA Geleen (NL). |           | <b>(81) Designated States:</b> AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GD, GE, HR, HU, ID, IL, IS, JP, KP, KR, LC, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |
| <b>(54) Title:</b> PROCESS TO PREPARE A PENTENOIC ACID ANHYDRIDE<br><br><b>(57) Abstract</b><br><br>Process to prepare a pentenoic acid anhydride in the presence of a catalyst comprising palladium and an organic phosphine ligand, wherein the corresponding alkoxycarbonyl butene is reacted with carbon monoxide at a temperature between 50 and 130 °C and that the phosphine is a monodentate phosphine or a bidentate phosphine.                                                                                                                                                                                                                                                                                           |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |