9906152-5

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B01J 21/06, 23/02, 23/50, 23/52, C07D 301/10 — A1

(11) International Publication Number: WO 99/00188

(43) International Publication Date: 7 January 1999 (07.01.99)

(21) International Application Number: PCT/US97/24270

(22) International Filing Date: 18 December 1997 (18.12.97)

(30) Priority Data:
PCT/US97/14414 ✓ 30 June 1997 (30.06.97) WO
(34) Countries for which the regional or international application was filed: US et al.
PCT/US97/14417 ✓ 30 June 1997 (30.06.97) WO
(34) Countries for which the regional or international application was filed: US et al.
PCT/US97/14415 30 June 1997 (30.06.97) WO
(34) Countries for which the regional or international application was filed: US et al.

(71) Applicant *(for all designated States except US)*: THE DOW CHEMICAL COMPANY [US/US]; 2030 Dow Center, Midland, MI 48674 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: BOWMAN, Robert, G. [US/US]; 1307 Kirkland Drive, Midland, MI 48640 (US). CLARK, Howard, W. [US/US]; 4318 Forestview Drive, Midland, MI 48642 (US). KUPERMAN, Alex [CA/US]; 903 Deerfield Court, Midland, MI 48640 (US). MEIMA, Garmt, R. [NL/US]; 4705 Pinewood Drive, Midland, MI 48640 (US). HARTWELL, George, E. [US/US]; 2908 Georgetown Drive, Midland, MI 48642 (US).

(74) Agent: TREANGEN, John, B.; Patent Dept., P.O. Box 1967, Midland, MI 48641–1967 (US).

(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, HU, ID, 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, GM, 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
With international search report.

(54) Title: PROCESS FOR THE DIRECT OXIDATION OF OLEFINS TO OLEFIN OXIDES

(57) Abstract

A process and catalysts for the direct oxidation of an olefin having three or more carbon atoms, such as propylene, by oxygen to an olefin oxide, such as propylene oxide. The process involves contacting the olefin under reaction conditions with oxygen in the presence of hydrogen and a catalyst. The catalyst contains silver and titanium, optionally gold, and optionally, at least one promoter element selected from Group 1, Group 2, zinc, cadmium, the lanthanide rare earths, and the actinide elements. Suitable supports include titanium dioxide, titanium dioxide on silica, titanosilicates, promoter metal titanates, titanium dispersed on silica and promoter metal silicates.