

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
23 February 2006 (23.02.2006)

PCT

(10) International Publication Number
WO 2006/019399 A2(51) International Patent Classification:
C07C 5/327 (2006.01)(21) International Application Number:
PCT/US2005/002829

(22) International Filing Date: 2 February 2005 (02.02.2005)

(25) Filing Language: English

(26) Publication Language: English

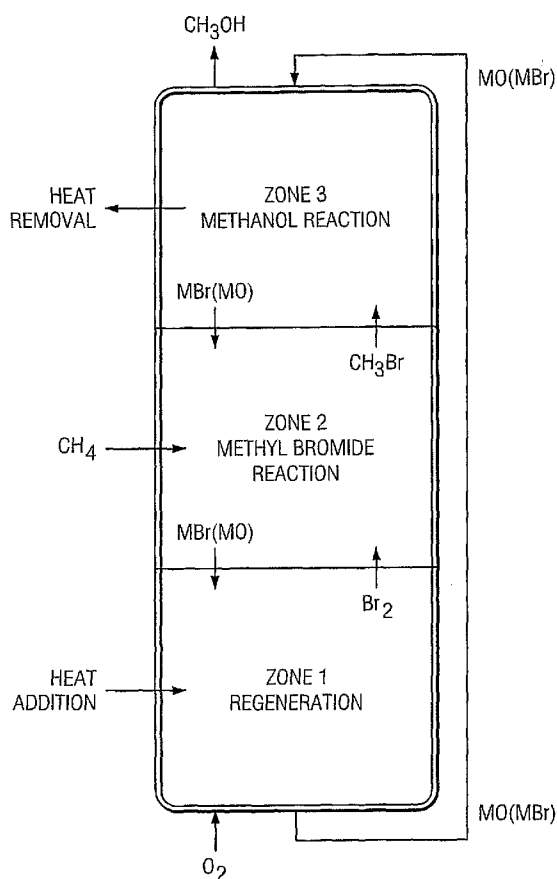
(30) Priority Data:
10/894,165 19 July 2004 (19.07.2004) US(71) Applicant (for all designated States except US): **GRT, INC.** [US/US]; P.O. Box 130906, The Woodlands, TX 77381 (US).(72) Inventors: **GROSSO, Philip**; 1201 Squirrel Creek Place, Auburn, CA 95602 (US). **SHERMAN, Jeffrey, H.**; 301 B South Wimbrow Drive, Sebastian, FL 32958 (US). **MC-FARLAND, Eric, W.**; 820 Poinsettia Way, Santa Barbara, CA 93111 (US).(74) Agent: **O'NEIL, Michael, A.**; Michael A. O'Neil, P.C., 5949 Sherry Lane, Suite 820, Dallas, TX 75225 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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(54) Title: ZONE REACTOR



(57) Abstract: In a method of converting alkanes to their corresponding alcohols, ethers, olefins, and other hydrocarbons, a vessel comprises a hollow, unsegregated interior defined first, second, and third zones. In a first embodiment of the invention oxygen reacts with metal halide in the first zone to provide gaseous halide; halide reacts with the alkane in the second zone to form alkyl halide; and the alkyl halide reacts with metal oxide in the third zone to form a hydrocarbon corresponding to the original alkane. Metal halide from the third zone is transported through the vessel to the first zone and metal oxide from the first zone is recycled to the third zone. A second embodiment of the invention differs from the first embodiment in that metal oxide is transported through the vessel from the first zone to the third zone and metal halide is recycled from the third zone to the first zone. In a third embodiment of the invention the flow of gases through the vessel is reversed to convert the metal oxide back to metal halide and to convert the metal halide back to the metal oxide.



Published:

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