



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C07C 51/14	A1	(11) International Publication Number: WO 99/59952 (43) International Publication Date: 25 November 1999 (25.11.99)
(21) International Application Number: PCT/US99/10709 (22) International Filing Date: 14 May 1999 (14.05.99) (30) Priority Data: 60/085,632 15 May 1998 (15.05.98) US (71)(72) Applicants and Inventors: SPIVEY, James, J. [US/US]; 202 E. Green Forest Court, Cary, NC 27511 (US). GOGATE, Makarand, R. [IN/US]; 12349 Metric Boulevard, Austin, TX 78758 (US). (74) Agents: BEAUMONT, William, E. et al.; Oblon, Spivak, McClelland, Maier & Neustadt, P.C., Suite 400, 1755 Jefferson Davis Highway, Arlington, VA 22202 (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, GM, HR, 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, SL, 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). Published <i>With international search report.</i> <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>
(54) Title: METHOD OF PREPARING ALKYL CARBOXYLIC ACIDS BY CARBOXYLATION OF LOWER ALKANES METHANE <pre> graph LR Input[Oxygen or Air / Fuel] --> Combustor[Combustors] Combustor --> FlueGas[Flue Gas: O2, CO2, H2O, N2] FlueGas --> CO2Recovery[CO2 Recovery] CO2Recovery --> CO2[CO2] CH4[CH4] --> CH4Carboxylation[CH4 Carboxylation] CO2 --> CH4Carboxylation CH4Carboxylation --> AceticAcid[Acetic Acid] </pre> Example of an integrated CO₂ recovery and reuse scheme.		
(57) Abstract A method of producing alkyl carboxylic acids, such as acetic acid directly by carboxylation of alkanes, such as methane, which entails reacting carbon dioxide and the alkane in the presence of a heterogeneous catalyst to form the lower alkyl.		