

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
8 July 2004 (08.07.2004)

PCT

(10) International Publication Number
WO 2004/056732 A1

(51) International Patent Classification⁷: **C07C 29/16**,
45/50

Frederik, Hendrik [NL/NL]; Badhuisweg 3, NL-1031
CM Amsterdam (NL).

(21) International Application Number:
PCT/EP2003/050771

(22) International Filing Date: 31 October 2003 (31.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/434,921 19 December 2002 (19.12.2002) US

(81) Designated States (*national*): 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, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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

(71) Applicant (*for all designated States except US*): **SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.** [NL/NL]; Carel van Bylandtlaan 30, NL-2596 HR The Hague (NL).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **ELLISON, Robert, Hardy** [US/GB]; 33 Caughall Road, Upton, Chester CH2 1LR (GB). **KRAGTWIJK, Eric** [NL/NL]; Badhuisweg 3, NL-1031 CM Amsterdam (NL). **VAN DER STEEN,**

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: HYDROFORMYLATION PROCESS IN THE PRESENCE OF A SULFUR-CONTAINING ADDITIVE

(57) Abstract: A hydroformylation process comprising reacting a compound having at least one olefinic carbon-to-carbon bond with hydrogen and carbon monoxide in the presence of a cobalt catalyst, the hydroformylation process being carried out in one or more reactors, at least one of which comprises a gas cap region and a liquid-containing region while in use, characterized in that a sulphur-containing additive is present on the inside walls of the gas cap region of the at least one reactor which comprises a gas cap region and a liquid-containing region. The sulphur-containing additive suppresses the formation of methane during the hydroformylation process.

