

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
17 November 2005 (17.11.2005)

PCT

(10) International Publication Number
WO 2005/107943 A1

(51) International Patent Classification⁷: **B01J 27/053**,
23/26, 21/04, C08F 4/24, 110/02

(21) International Application Number:
PCT/US2005/009668

(22) International Filing Date: 24 March 2005 (24.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/829,850 22 April 2004 (22.04.2004) US
10/829,844 22 April 2004 (22.04.2004) US

(71) Applicant (for all designated States except US):
CHEVRON PHILLIPS CHEMICAL COMPANY LP [US/US]; 10001 Six Pines Drive, The Woodlands, TX 77380 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MCDANIEL, Max P.** [US/US]; 1601 Melmart Drive, Bartlesville, Oklahoma 74006 (US). **COLLINS, Kathy S** [US/US]; 3915

Silver Lake Drive, Bartlesville, Oklahoma 74006 (US). **BENHAM, Elizabeth A.** [US/US]; 9310 Katie Grace Circle, Spring, Texas 77379 (US). **DESLAURIERS, Paul J.** [US/US]; 1031 Kings Circle, Bartlesville, Oklahoma 74006 (US).

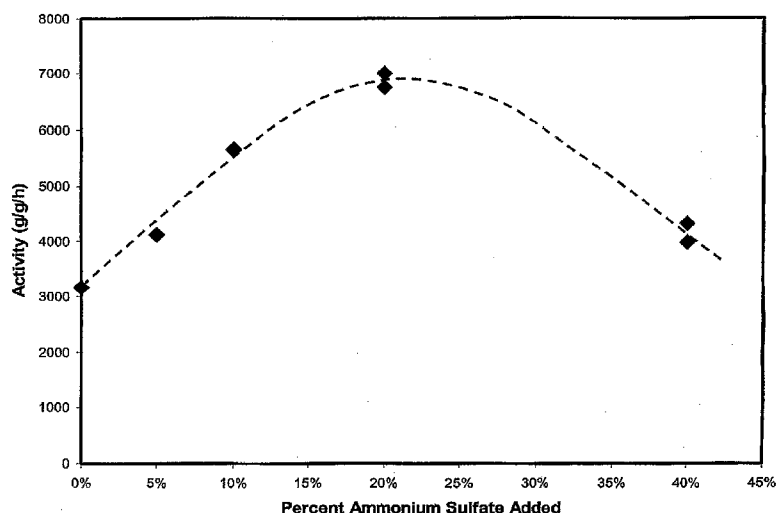
(74) Agent: **BROWN, Kimberly L.**; Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380 (US).

(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,

[Continued on next page]

(54) Title: METHODS OF PREPARING ACTIVE CHROMIUM/ALUMINA CATALYSTS VIA TREATMENT WITH SULFATE AND POLYMERS PRODUCED USING THE CHROMIUM/ALUMINA CATALYSTS



(57) Abstract: Methods of preparing a polymerization catalyst are provided that include contacting a support comprising alumina with a sulfating agent and with chromium. The support can be calcined after loading the sulfating agent and the chromium on the support. Alternatively, the sulfating agent can be loaded on the support while calcining it. Alternatively, the support can be calcined after contacting it with the sulfating agent and before contacting it with an organochromium compound. Catalysts compositions comprising chromium and a sulfate treated alumina support that were formed by the foregoing method are provided. The catalyst compositions have increased catalyst activity. Methods of producing a polymer include contacting at least one olefin with the catalyst compositions are provided. The polymer compositions exhibit relatively low levels of long chain branching and relatively high molecular weights.

WO 2005/107943 A1



FR, GB, GR, HU, IE, IS, IT, 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).

— *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments*

Published:

— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*