(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
3 March 2011 (03.03.2011)

PCT

(10) International Publication Number
WO 2011/023668 A3

(51) International Patent Classification:
***B01J 23/888*** (2006.01) ***B01J 21/04*** (2006.01)
***B01J 23/88*** (2006.01) ***B01J 37/02*** (2006.01)
***B01J 27/185*** (2006.01) ***B01J 37/08*** (2006.01)
***B01J 27/19*** (2006.01)

(21) International Application Number:
PCT/EP2010/062282

(22) International Filing Date:
24 August 2010 (24.08.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/236,436 24 August 2009 (24.08.2009) US

(71) Applicant *(for all designated States except US)*: **ALBEMARLE EUROPE SPRL** [BE/BE]; Parc Scientifique de LLN, Rue du Bosquet 9, B-1348 Louvain-la-Neuve (BE).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **EIJSBOUTS-SPICKOVA, Sona** [NL/NL]; Goudenregenstraat 1, NL-5253 BE Nieuwkuijk (NL). **JANSEN, Marcel Adriaan** [NL/NL]; Stepelerveld 65, NL-2151 JM Nieuw Vennep (NL).

(74) Agent: **WESTENDORP | SOMMER**; Uhlandstr. 2, 80336 München (DE).

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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published**:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
19 May 2011

WO 2011/023668 A3

(54) Title: SOLUTIONS AND CATALYSTS COMPRISING GROUP VI METAL, GROUP VIII METAL, PHOSPHOROUS AND AN ADDITIVE

(57) Abstract: This invention provides a process for forming a solution composition, which process comprises forming a primary solution by bringing together, in an aqueous medium, i) at least one phosphorus compound, ii) at least one Group VI metal compound, iii) at least one Group VIII metal compound, and iv) an additive which is a) tetraethylene glycol, b) polyethylene glycol having an average molecular weight in the range of about 200 to about 400, c) a mixture of tetraethylene glycol and polyethylene glycol having an average molecular weight in the range of about 200 to about 400, or d) a mixture of (1) tetraethylene glycol and/or polyethylene glycol having an average molecular weight in the range of about 200 to about 400 and (2) one or more of monoethylene glycol, diethylene glycol, and triethylene glycol. The molar ratio of additive to the total moles of Group VI metal and Group VIII metal is above 0.30:1, and the atomic ratio of phosphorus to Group VI metal is at least about 0.33: 1. Optionally, the primary solution is heated at a temperature above about 40°C to form a heated solution. The heated solution is optionally cooled to form a cooled solution. Also provided are compositions formed by such processes, processes for forming catalyst compositions from these compositions, and catalyst compositions formed by these processes.