



- (51) **International Patent Classification:**
B01J 8/06 (2006.01) *C07C 45/28* (2006.01)
- (21) **International Application Number:**
PCT/US2013/055689
- (22) **International Filing Date:**
20 August 2013 (20.08.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/704,636 24 September 2012 (24.09.2012) US
13/652,522 16 October 2012 (16.10.2012) US
- (71) **Applicant:** ARKEMA INC. [US/US]; 900 First Avenue,
King of Prussia, Pennsylvania 19406 (US).
- (72) **Inventors:** DECOURCY, Michael S.; 15411 Pineut Bay
Court, Houston, Texas 77059 (US). STEINBACH, John
L.; 6144 Exeter Road, League City, Texas 77573 (US).
DUPONT, Nicolas; 20, Lotissement les Capucines, F-
57500 Saint Avold (FR). ROUNDY, Roger L.; 5402
Chapel Trace Court, Rosharon, Texas 77583 (US).
- (74) **Agents:** MORREALE, Lynn B. et al.; Arkema Inc., 900
First Avenue, King of Prussia, Pennsylvania 19406 (US).

(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, BN, 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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

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

[Continued on next page]

(54) **Title:** REACTOR WITH IMPROVED RESISTANCE TO FOULING

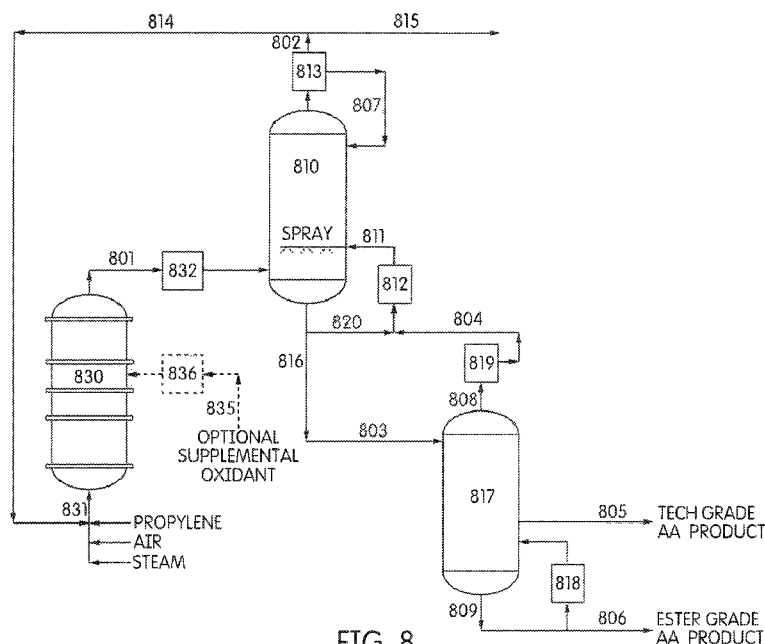


FIG. 8

(57) **Abstract:** The present disclosure relates to a single shell open interstage reactor ("SSOI"). The SSOI comprises a first reaction stage, an interstage heat exchanger, an open interstage region, and a second reaction stage. The SSOI may be configured for upflow or downflow operation. Further, the open interstage region of the SSOI may comprise a supplemental oxidant feed. When the open interstage region comprises a supplemental oxidant feed, the SSOI may further comprise a supplemental oxidant mixing assembly. Processes for producing acrylic acid through the oxidation of propylene are also disclosed.



— *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:**
22 May 2014