

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
13 April 2023 (13.04.2023)



(10) International Publication Number
WO 2023/059679 A1

(51) International Patent Classification:

C07C 67/39 (2006.01) C07C 69/54 (2006.01)
C07C 45/75 (2006.01) C07C 47/02 (2006.01)
C07C 45/50 (2006.01) C07C 47/22 (2006.01)
C07C 1/24 (2006.01) C07C 11/04 (2006.01)

MC, ME, 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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

(21) International Application Number:

PCT/US2022/045725

(22) International Filing Date:

05 October 2022 (05.10.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/253,563 08 October 2021 (08.10.2021) US

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))

(71) Applicant: **ROHM AND HAAS COMPANY** [US/US];
400 Arcola Road, Collegeville, Pennsylvania 19426 (US).

(72) Inventors: **LIMBACH, Kirk W.**; 400 Arcola Road, Collegeville, Pennsylvania 19426 (US). **CHAKRABARTI, Reetam**; 400 Arcola Road, Collegeville, Pennsylvania 19426 (US).

(74) Agent: **MUTSCHLER, Brian**; The Dow Chemical Company, Intellectual Property, P.O. Box 1967, Midland, Michigan 48641-1967 (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, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, 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, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, 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, ST, 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,

(54) Title: PROCESS FOR METHYL METHACRYLATE PRODUCTION FROM ETHANOL

(57) Abstract: A process for producing methyl methacrylate is disclosed, the method comprising: a) producing ethylene from ethanol; b) producing propionaldehyde from the ethylene produced in step a); c) producing methacrolein from propionaldehyde produced in step b) and formaldehyde; and d) producing methyl methacrylate in an oxidative esterification reaction from the methacrolein produced in step c) with methanol. Step c) is performed at a pressure above 1 bar. Step d) is performed in a reactor system in a liquid phase reaction in the presence of a heterogeneous noble metal-containing catalyst, wherein the reactor system comprises an oxygen-containing gas. An average concentration of methacrolein in step d) is less than 40 wt% based on the total weight of methanol and methacrolein. The reactor system of step d) has an average ratio of methanol to methacrolein less than 20:1 based on an average amount of methanol and methacrolein entering and exiting the system.



WO 2023/059679 A1