

(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 2023/059680 A1

(51) International Patent Classification:

C07C 67/39 (2006.01) C07C 47/22 (2006.01)

C07C 45/75 (2006.01) C07C 69/54 (2006.01)

(21) International Application Number:

PCT/US2022/045727

(22) International Filing Date:

05 October 2022 (05.10.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/253,564 08 October 2021 (08.10.2021) US

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

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

(74) Agent: **MUTSCHLER, Brian**; The Dow Chemical Com-
pany, Intellectual Property, P.O. Box 1967, Midland, Michi-
gan 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,
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))

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))

(54) Title: PROCESS FOR ALKYL METHACRYLATE PRODUCTION

(57) Abstract: A process for the production of an alkyl methacrylate is disclosed, the method comprising: a) producing methacrolein from propionaldehyde and formaldehyde; and b) reacting the methacrolein in an oxidative esterification reaction to obtain the alkyl methacrylate. Reacting the methacrolein in an oxidative esterification reaction comprises introducing a reaction mixture comprising the methacrolein, an alkyl alcohol, and an oxygen-containing gas to a reactor system comprising a heterogeneous noble metal-containing catalyst. An average concentration of methacrolein in step b) is less than 40 wt% based on the total weight of alkyl alcohol and methacrolein. The reactor system of step d) has an average ratio of alkyl alcohol to methacrolein less than 20:1 based on an average amount of alkyl alcohol and methacrolein entering and exiting the system. A liquid phase stream exiting the reactor system contains at least 30 wt% alcohol based on the total weight of the liquid phase stream. The liquid phase stream exiting the reactor system contains less than 30 wt% methacrolein based on the total weight of the liquid phase stream. The liquid phase stream exiting the reactor system comprises greater than 0.1 ppm and less than 5000 ppm of an alkyl isobutyrate. A gas phase stream exiting the reactor system comprises between 1 mol% and 7.5 mol% oxygen based on the total amount of the gas phase stream. The alkyl alcohol is a straight or branched alcohol comprising from 1 to 12 carbon atoms.

WO 2023/059680 A1