



(51) International Patent Classification:
B01D 53/84 (2006.01)

(21) International Application Number:
PCT/US2021/035235

(22) International Filing Date:
01 June 2021 (01.06.2021)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
63/032,780 01 June 2020 (01.06.2020) US

(71) Applicant: **SOLUGEN, INC.** [US/US]; 14549 Minnetta Street, Houston, Texas 77035-6523 (US).

(72) Inventors: **HUNT, Sean**; c/o Solugen, Inc., 14549 Minnetta Street, Houston, Texas 77035-6523 (US). **LOFTIS, Kevin**; c/o Solugen, Inc., 14549 Minnetta Street, Houston, Texas 77035-6523 (US). **NGUYEN, Peter**; c/o Solugen, Inc., 14549 Minnetta Street, Houston, Texas 77035-6523 (US). **PATEL, Parth**; c/o Solugen, Inc., 14549 Minnetta Street, Houston, Texas 77035-6523 (US).

(74) Agent: **FALESKI, Thaddeus J.** et al.; CONLEY ROSE, P.C., 777 North Eldridge Parkway, Suite 600, Houston, Texas 77079 (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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, 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, 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, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: TRICKLE BED REACTOR

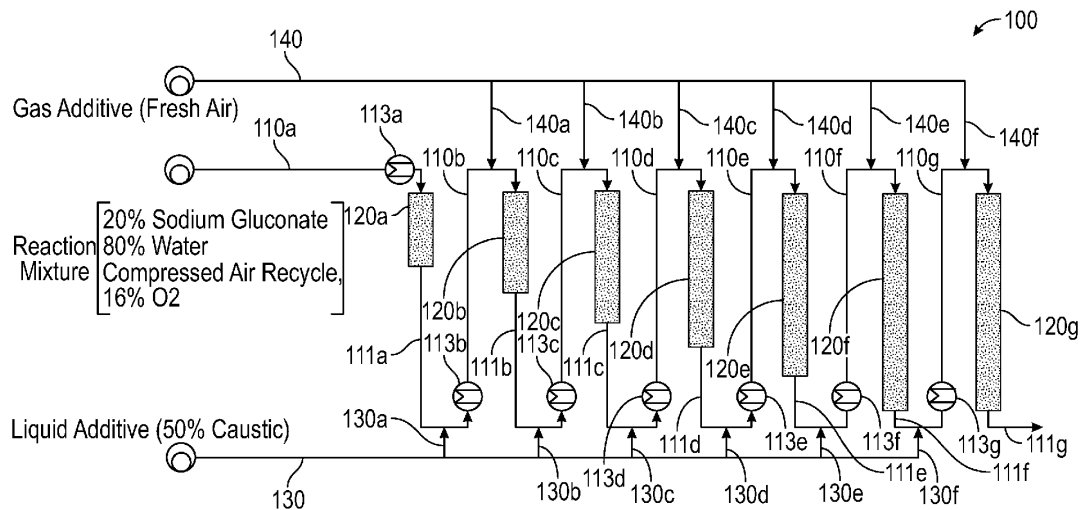


FIG. 1

(57) Abstract: A trickle bed reactor, comprising a plurality of catalyst beds connected in series and progressively increasing in catalyst mass in a direction from upstream to downstream; and a plurality of heat exchangers, wherein each of the heat exchangers is located between two of the plurality of catalyst beds, and wherein each of the heat exchangers does not exchange heat with an outer surface of a vessel that contains any of the catalyst beds.

[Continued on next page]

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))*