

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
16 April 2020 (16.04.2020)



(10) International Publication Number
WO 2020/076755 A1

(51) International Patent Classification:

C02F 3/30 (2006.01) C02F 3/00 (2006.01)
C02F 101/16 (2006.01) C02F 3/08 (2006.01)
C02F 101/10 (2006.01) C02F 3/10 (2006.01)

(21) International Application Number:

PCT/US2019/055099

(22) International Filing Date:

08 October 2019 (08.10.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/744,671 12 October 2018 (12.10.2018) US

(71) Applicant: **VEOLIA WATER SOLUTIONS & TECHNOLOGIES SUPPORT** [FR/FR]; Immeuble L'Aquarene, 1 place Montgolfier, 94417 Saint-Maurice (FR).

(72) Inventors; and

(71) Applicants (for US only): **LEMAIRE, Romain** [FR/FR]; 42 rue du professeur Debré, 37210 Vernou sur Brenne (FR).
ZHAO, Hong [US/US]; 2436 Lullwater Drive, Raleigh, North Carolina 27604 (US).

(74) Agent: **COATS, Larry L.**; Coats & Bennett, PLLC, 1400 Crescent Green, Suite 300, Cary, North Carolina 27518 (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, JO, JP, KE, KG, KH, KN, KP,

(54) Title: MAINSTREAM DEAMMONIFICATION PROCESS EMPLOYING BYPASS PRIMARY EFFLUENT AND STEP FEEDING

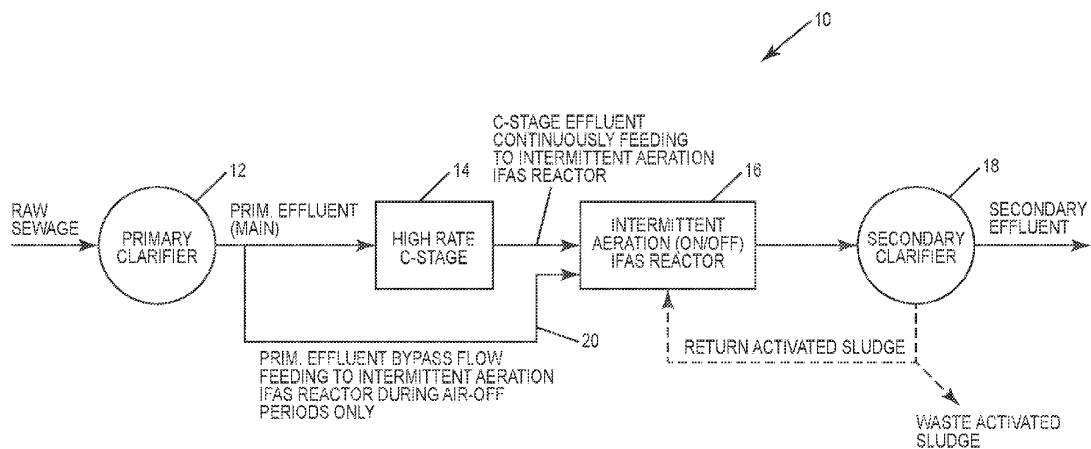


FIGURE 1

(57) Abstract: The present invention relates to a mainstream deammonification process for removing ammonium from wastewater that suppresses NOB growth and produces a sludge having good settling characteristics, the process comprising: clarifying the wastewater stream in a primary clarifier (12) and producing a primary effluent; directing a first portion of the primary effluent to a biological treatment reactor (14) and removing carbon to produce treated wastewater; directing treated wastewater into an integrated fixed film activated sludge (IFAS) deammonification reactor (16) integrating nitrification and anammox processes and that is provided with intermittent aeration; directing a second portion of the primary effluent to the IFAS deammonification reactor (16) by-passing the biological treatment reactor (14), and injecting this second portion only during periods of air off and refraining from injecting during periods of air on, directing the IFAS deammonification reactor (16) effluent to a secondary clarifier (18) and producing a secondary effluent and a clarifier underflow, and recycling at least a portion of the underflow to the IFAS deammonification reactor (16).

[Continued on next page]

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, 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, 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, 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))*