NITROGEN REMOVAL FROM INK-JET TEXTILE PRINTING WASTEWATER BY GRANULAR PN/ANAMMOX REACTOR

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Digital textile printing is a rapidly spreading technology, thanks to the significant productivity and flexibility improvements brought in this globally spread industrial sector. On the other hand, wastewater originating from rinsing baths are rich in nitrogen (up to 600 mg/L of ammonium or organic nitrogen), due to the massive use of urea in conditioning the textile before printing. Such high concentration prevents the direct discharge into water bodies and even in public sewers. Dedicated on-site pretreatment of this industrial wastewater is necessary and a space/energy effective technology suitable for on-site application is needed.

Autotrophic nitrogen removal is an established solution for treating nitrogen-rich wastewaters. The LIFE DeNTreat project applied a single-stage partial nitritation (PN)/anammox process as a decentralized treatment to industrial wastewater from digital textile printing. PN/anammox offers an economically feasible alternative for wastewaters with low COD/N and high nitrogen concentration that would exceed the limits for discharge even into public sewer systems with local derogations up to 100 mg/L.

Experimental data confirmed the ability of the PN/anammox treatment to lower nitrogen content below the regulatory limit for discharge into the sewer. Modelling demonstrated relevant benefits of the on-site treatment prior to the final step in a centralized wastewater treatment plant (WWTP): i.e. reductions on energy consumption (-15%), elimination of external carbon source at existing WWTP, sludge production (-25%). Results from lab and pilot scale reactors are reported along with the main lesson learned and criticalities to be considered for scale-up.

Keywords: Industrial wastewater, Decentralized treatment, Deammonification, PN/anammox process, Process scale-up