

TITLE: INFLUENCE OF CARBON SOURCE AND CARBON/NITROGEN RATIO IN AMMONIUM REMOVAL BY BACTERIA FROM EFFLUENT TREATMENT STATION.

AUTHORS: SILVA, L.C.F.¹; LIMA, H.S.¹; DE PAULA, S.O.¹; SOUSA, M.P.²; DE OLIVEIRA, V.M.³; SILVA, C.C.¹.

INSTITUTION: ¹UNIVERSIDADE FEDERAL DE VIÇOSA- UFV (AVENIDA PH ROLFS, SEM NÚMERO, CEP 36570000, VIÇOSA - MG, BRAZIL);

²CENPES/PETROBRÁS (AVENIDA HORÁCIO MACEDO, 950, CIDADE UNIVERSITÁRIA, FUNDÃO, RIO DE JANEIRO - RJ, BRAZIL);

³CPQBA/UNICAMP - UNIVERSIDADE ESTADUAL DE CAMPINAS (CAMPINAS - SP, BRAZIL)

ABSTRACT: Oil refineries consume lot of water generating high amounts of effluent containing toxic compounds like ammonium, that when discarded can be harmful to the environment, so before this, it should be treated. Among the treatments available for the removal of ammonium, the biological has been the most used. The removal can occur through different routes: aerobic autotrophic nitrification /anaerobic denitrification, which is a well-known and consolidated route, where each stage is performed by different microorganisms, and heterotrophic nitrification/aerobic denitrification (HN/AD), where a single heterotrophic microorganism is able to do the two steps under aerobic conditions. However, little is known about this pathway, what and how microorganisms do this, and how factors such as salinity, pH, temperature, carbon source and carbon/nitrogen ratio (C/N) affect the ammonium removal. Therefore, characterization of these microorganisms are important to understand this process, aiming the optimization of the ammonium removal in treatment plants. So, the aim of this work was to characterize HN/AD isolates for carbon source and C/N ratio preferred for ammonium removal. Then, bacteria isolated from activated sludge previously characterized as HN/AD were inoculated in specific HMN medium with different carbon sources (sodium pyruvate, sucrose, sodium acetate, sodium citrate, sodium succinate, glucose) and with different C/N ratios (4, 6, 8, 10, 12) and incubated for 72h at 150 rpm. The ammonium removal and the optical density were measured all day. Analyzes were done in triplicate and the results were submitted to ANOVA ($\alpha=5\%$). The isolates were identified as: *Gordonia amicalis*, *Pseudomonas stutzeri*, *Pseudomonas balearica* and *Rhodococcus ruber*. The results showed that for all isolates the best source of carbon was sodium citrate, except for *R. ruber*. For this, with 48h of incubation, 100% of ammonium was removed in the medium with pyruvate, citrate and sodium succinate. The *P. stutzeri* removed 100% of ammonium with 24h with sodium citrate source and C/N 8 ratio. All isolates showed that the best C/N ratio was 8. The *P. stutzeri* was highlight, removing 100% of ammonium with 24h in medium with sodium citrate and C/N ratio 8. Another important fact is that within these conditions, all isolates, within 3 days, removed 100% of ammonium producing a lower biomass in relation to the other treatments, which is important for the application in effluent treatment plants.

Keywords: heterotrophic nitrification; ammonium removal; C/N ratio; carbon source.

Development Agency: Universidade Federal de Viçosa

Acknowledgement: CAPES, CNPq, PETROBRAS and FAPEMIG