CN 101054232 A (2007) discloses a highly efficient biological waste water treatment process for hypersaline waste water, generating an aerobic granular sludge in a sequencing batch reactor without the use of halophilic bacteria, so hypersaline waste water can be processed effectively and the resistance to salinity shock of the system can be improved.

WO 2010/076794 A1 (2010) discloses a method for denitrifying brine by adding halotolerant, anaerobic bacteria. The denitrification takes place at neutral pH conditions and a carbon source is added, at a temperature of about 37 °C. The process is performed in a fluidized bed bioreactor. The brine treated contains only 0.5 to 4 % salt, 2 g/l chloride, and 0.05 g/l nitrate (as N), which is far less than in the present invention.

The prior art does not disclose a biochemical process that focuses on quick nitrate removal in the presence of a high concentration of chlorides for an inorganic wastewater treatment using a specific combination of bacteria.

Summary

In one aspect, there is provided biochemical process for the denitrification of a hypersaline wastewater composition, comprising a concentration of at least 0.1 % (w/v) of nitrate and a concentration of at least 5 % (w/v) of chloride, comprising the step of using a community of halophilic and/or halotolerant bacteria, and optionally also containing non-specialized members, for the denitrification of said hypersaline wastewater, wherein said process comprises selecting said community from a sludge mix consisting of from 85 to 95 weight% of activated sludge from the denitrification step of a municipal waste water treatment plan and of from 5 to 15 weight% of saline sludge from the crystallizer pond of a solar saltern, and wherein the sludge comprises bacteria from at least the following genera: *Pseudomonas, Bacillus* and *Halomonas*.

Detailed description of the invention

The invention relates to a biochemical process for the denitrification of an hypersaline wastewater composition comprising a high concentration of nitrate in the presence of a high concentration of chloride.

According to the invention, an hypersaline wastewater composition comprising a high concentration of nitrate is subjected to a biochemical treatment, wherein said high concentration of nitrate, in the presence of a high concentration of chloride, is reduced to a lower concentration, preferably in a short time, by exposing said hypersaline wastewater composition to halophilic and/or halotolerant bacteria.

According to the invention, a biochemical process is disclosed for the denitrification of an hypersaline wastewater composition, comprising a concentration of at least 0.1 % (w/v) of nitrate and a concentration of at least 5 % (w/v) of chloride, using halophilic and/or halotolerant bacteria.

According to one embodiment, a biochemical process is disclosed for the denitrification of a hypersaline wastewater composition, originating

CLAIMS

1. Biochemical process for the denitrification of a hypersaline wastewater composition, comprising a concentration of at least 0.1 % (w/v) of nitrate and a concentration of at least 5 % (w/v) of chloride, comprising the step of using a community of halophilic and/or halotolerant bacteria, and optionally also containing non-specialized members, for the denitrification of said hypersaline wastewater, wherein said process comprises selecting said community from a sludge mix consisting of from 85 to 95 weight% of activated sludge from the denitrification step of a municipal waste water treatment plan and of from 5 to 15 weight% of saline sludge from the crystallizer pond of a solar saltern, and wherein the sludge comprises bacteria from at least the following genera: *Pseudomonas, Bacillus* and *Halomonas*.

2. The process according to claim 1 for the treatment of hypersaline waste water originating from an ion exchange process, comprising a concentration of at least 0.1 % (w/v) of nitrate and a concentration of at least 5 % (w/v) of chloride.

3. The process according to any one of claims 1 to 2, wherein the concentration of nitrate is at least 0.20 % (w/v), more preferably 0.25 % (w/v).

4. The process according to any one of claims 1 to 3 for the treatment of hypersaline waste water originating from a production process utilising potassium chloride and calcium nitrate to produce a calcium chloride and nitrate containing waste water stream.

5. The process according to any one of claims 1 to 4 for the treatment of hypersaline waste water originating from a production process utilising sodium chloride and calcium nitrate to produce a calcium chloride and nitrate containing waste water stream.

6. The process according to any one of claims 1 to 5, wherein said community is selected from a sludge mix consisting for 90 weight% of activated sludge from the denitrification step of a municipal waste water treatment plan and for 10 weight% of saline sludge from the crystallizer pond of a solar saltern.

7. The process according to any one of claims 1 to 6, wherein the halophilic bacteria are selected from the genera of *Pseudomonas* (abundance : 19 weight%), *Bacillus* (abundance : 4 weight%) and *Halomonas* (abundance : 3 weight%), and optionally with minor (1 weight% or less) abundance *Rhodobacter, Arthrobacter, Flexibacter, Propionibacterium*, Enterobacteriaceae, *Flavobacterium, Bradyrhizobium, Hyphomicrobium, Lysobacter, Sinorhizobium, Azospirillum, Thiobacillus, Sphingobacter, Paracoccus, Aeromanas, Ochrobacterium, Nitrosomonas, Herbaspirillum, Janthinobacterium, Lactobacillus, Nitrobacter, Cellulomonas, Streptomycetes, Cytophaga, Thiomicrospira, Beggiatoa, Cellvibrio, Moraxella, Alteromonas, Kingella, Aquaspirillium, Norcadia* and *Azoarcus*.

8. The process according to any one of claims 1 to 7, wherein said process operates at 35°C to 40°C, preferably at 37°C.

9. The process according to any one of claims 1 to 8, wherein potassium acetate is used as a carbon source.

10. The process according to any one of claims 1 to 9 wherein an initial nitrate concentration of 1.5 to 3.0 g/l is reduced to a concentration of 0.001 g/l within 24 to 48 hours.

11. The process according to any one of claims 1 to 10, wherein the process is performed in a bioreactor of a suspended sludge reactor type.

12. The process according to any one of claims 1 to 10, wherein the process is performed in a bioreactor of a floating bed reactor type.