polymetron

Ammonia and nitrate monitoring in waste water for (de)nitrification control

application note

8810 analyser

1 - Why should nutrient salts be removed from waste water

Uncontrolled discharge of waste water into water courses and oceans is upsetting the balance of nature to such an extent that the fisheries, the aquatic life and the quality of drinking water sources are threatened.

Regrettably, it is a fact that many water courses, lakes and even large near-shore beds are already devastated. Waste water treatment has been concentrated on the removal of organic matter, grease and sludge as the discharge of these matters causes immediate ecological problems. However, this treatment is inadequate when it comes to the long-term effects

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of waste water discharge.

The content of nutrient salts (nitrogen and phosphorus) in waste water causes a rampant growth of algea. This phenomenon, called eutrophication, will inevitably lead to a serious oxygen deficiency In the recipient. At some point, high concentrations of algea will necessitate that precautionary measures, urgently taken if the water source concerned is to be saved.

2 - Nitrification - Denitrification processes

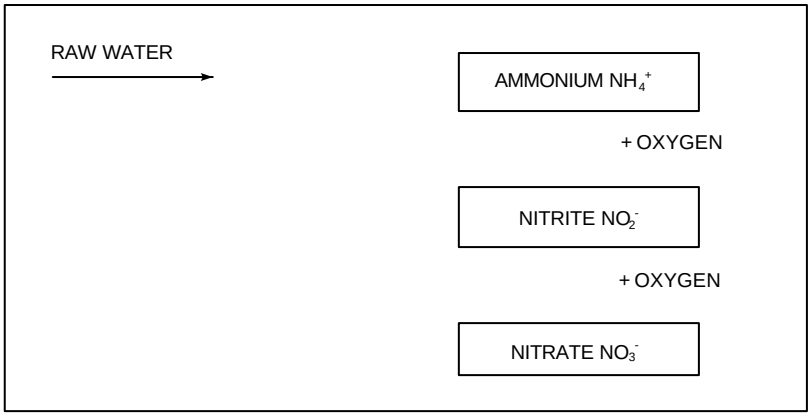
Nitrification and denitrification are waste water treatment processes designed to counter the serious consequences of discharging nutrient salts into the natural courses.

The resulting effluent quality in among the very best obtainable as indicated by the average values on a daily basis :

AMMONIA	(in N-NH_4)	0.5 - 2 mg/l
NITRATE	(in N-NO_3)	2 - 4 mg/l
TOTAL NITROGEN		6 - 8 mg/l

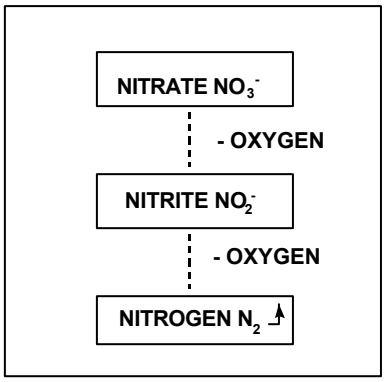
NITRIFICATION

Nitrification is the process in which ammonia nitrogen is oxidized into nitrite (NO_2) and then into nitrate (NO_3). The nitrifying bacteria which converts ammonia into nitrate only works when oxygen is present, i.e in an **aerobic** environment.



DENITRIFICATION

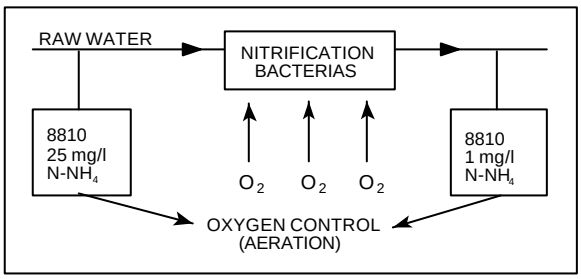
Denitrification is the process where the denitrifying bacteria converts the formed nitrate into nitrogen gas N_2. The gas disappears into the atmosphere which in fact already contains 78 % nitrogen gas. The denitrifying bacteria works when no oxygen is present, i.e in an ANOXIC environment.



3.1- Why ammonia monitoring in nitrification process ?

As explained NITRIFICATION requires additionnal oxygen which is rather expensive and its concentration is critical for a good efficiency of the process.

In order to control the aeration, two 8810 analysers are installed : one at the inlet and the other at the outlet.



The ION SELECTIVE 8810 ANALYSER was chosen for its unique method of operation (no sample filtration required - screening only) and for the following benefits :

=> Easily programmable
=> Automatic temperature compensation
=> Automatic reactor cleaning
=> Automatic calibration
=> Standard addition measurements
=> Low maintenance

3.2 - 8810 ammonia analyser system configuration

. 368810, 36XXX	Analyser model, ISE base unit includes ammonia measuring electrode, temperature sensor Pt100 and reagent peristaltic pump for sample conditionning with NaOH.
	XXX = 220 220V/50Hz XXX = 240 240V/50Hz XXX = 116 110V/60Hz XXX = 115 110V/50Hz
. 368810,56000	Automatic chemical cleaning system
. 368810,76000	Automatic heating device / controller

OPTIONS

. 368810,71050	Automatic calibration pump, micro piston complete with canister and level detector
. 368810,76000	Automatic heating device/controller
. 368810,40000	Wall mounted fiberglass cabinet
. 368810,45000	Free standing cabinet
. 08811=A=20XY	8811 sample sequencer complete for 8810 analyser (2, 3, 4, 5, or 6 channels)

4.1 - Why nitrate monitoring in denitrification process ?

As explained denitrification process works in anoxic conditions i.e. without any oxygen addition. The bacterias used in this denitrification process might require the addition of carbon to increase the reaction. Therefore, an external carbon source has to be added in the form of organic substances. Typical chemical products used are ETHANOL and METHANOL.
In any case nitrate continuous measurement after the process gives an early indication of the denitrification efficiency.

4.2 - 8810 nitrate analyser system configuration

. 368810,35xxx	Analyse model ISE base unit, includes nitrate combination electrode, temperature sensor Pt100 and reagent peristaltic pump for sample conditioning
. 368810,56000	Automatic chemical cleaning system
. 368810,76000	Automatic heating device / controller

OPTIONS

. 368810,72000	Automatic calibration, pulse pump complete with canister and level detector
. 368810,40000	Wall mounting fiberglass cabinet
. 368810,45000	Free standing cabinet
. 08811=A=20XY	8811 sample sequencer complete for 8810 analyser (2,3,4,5 or 6 channels)