



**Genotech Inc. USA**



**Total Water Management**

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**Supply industrial water, wastewater, and enzyme products**

## **WASTEWATER SOLUTION**



**BioAmonia / EW5805**

### **BioAmonia**

**Application:** nitrifying bacteria that removes ammonia from wastewater.

### **BioAmonia的應用**

BioAmonia is a blend of nitrifying bacteria that removes ammonia from wastewater. It is used in a variety of industries that use aerobic treatment to establish, maintain, or restore nitrification.

BioAmonia是一種融合硝化細菌可去除污水中氨的濃度。BioAmonia可運用在各種好氧處理系統內、建立產業，維持或恢復生物處理硝化反應流程中。

#### **Benefits 優點**

BioAmonia is the quickest and most reliable solution for nitrification. It helps prevent ammonia related permit violations and simplifies wastewater operations.

BioAmonia是一種可進行硝化反應最快和最可靠的生物處理產品。它可助於防止氨濃度超標的相關環保違法行為，並可簡化廢水操作的工藝流程。

Bioaugmentation with BioAmonia makes the nitrification process more robust, enabling industrial wastewater plants to withstand higher loading of toxic waste streams and waste streams containing high concentrations of ammonia or other nitrogenous compounds. BioAmonia helps ensure compliance by shortening the recovery time after process upsets and reducing the impact of shock loads on effluent quality.

生物處理法與BioAmonia互相配合、可使硝化過程更加強勁而有效，可使工業污水處理廠，能承受高負荷等有毒廢液和廢物流且含有高濃度的氨或其他含氮化合物。BioAmonia可確保環境環保的合法性，縮短污水處理中所受衝擊後的恢復過程的時間，減少了因衝擊負荷對排放水質的影響。

**BioAmonia promotes consistent and reliable treatment and reduces the need for nitrification-related operational changes. It has a wide range of activity and helps ease operations in cold temperatures.**

BioAmonia可促進連續性可靠的處理，並減少需要進行硝化反應等相關操作技術的改變。它可廣泛運用在許多的廢水處理系統、在寒冷的溫度下也可幫助簡化系統的操作。

#### **Performance 性能**

Nitrification is a two-step aerobic process. In the first step, beneficial microorganisms oxidize ammonium ( $\text{NH}_4^+$ ) to nitrite ( $\text{NO}_2^-$ ) and Nitrite is oxidized to nitrate ( $\text{NO}_3^-$ ) in the second reaction. Nitrification is a sensitive process and is more easily interrupted than other biological wastewater treatment processes. The most frequent sources of nitrification problems include environmental factors, toxicity, solids washout, and loading variation. In some cases, environmental factors must be

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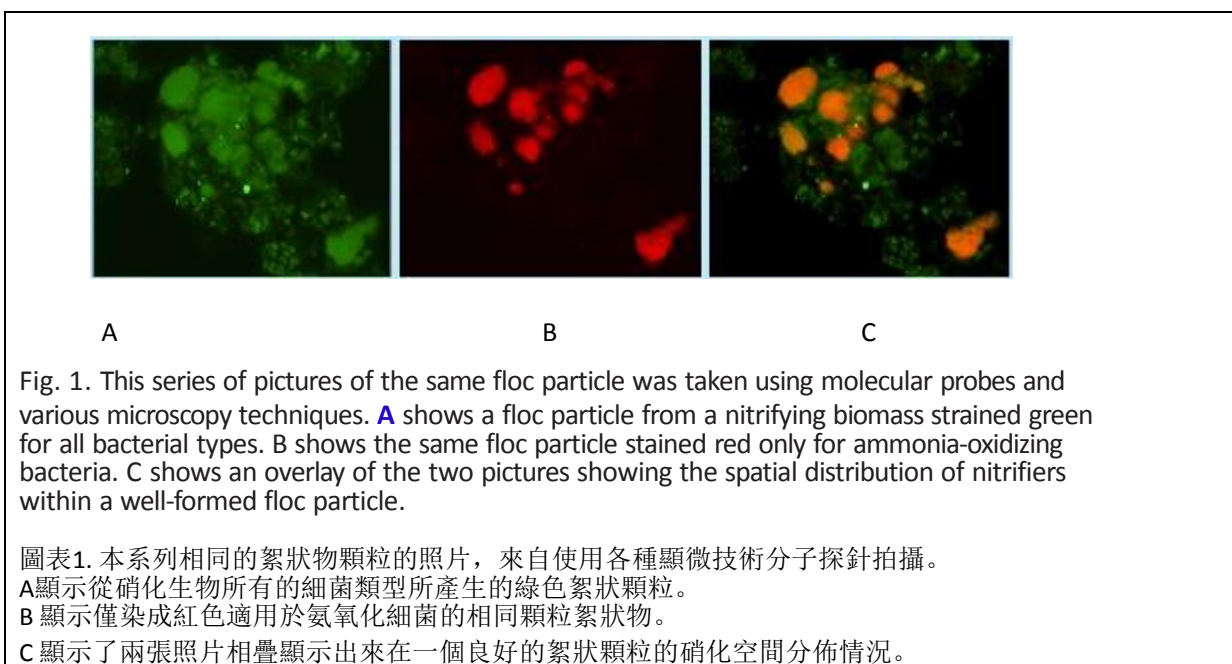


corrected prior to using BioAmonia.

硝化反應是在好氧流程中的一個兩階段反應的工藝。在第一階段步驟中，有益微生物可氧化銨（ $\text{NH}_4^+$ ）成為“亞硝酸鹽”（ $\text{NO}_2^-$ ）、在第二個反應中“亞硝酸鹽”可進一步氧化成“硝酸鹽”（ $\text{NO}_3^-$ ）。硝化反應過程是一個敏感的處理流程，在生物廢水處理過程非常容易被其它流程工藝影響而易中斷。此硝化反應問題，最常見的問題來自下列原因包括環境因素，毒性，固體沖洗，並系統負荷超載變化。使用BioAmonia 前、在一些情況下必需先行克服環境因素。

After BioAmonia is added to a wastewater system, nitrifying bacteria colonize on floc particles and become part of the biomass (Fig. 1). Having a healthy floc-forming microbial community helps maintain nitrifiers in the system and is important for the success of any nitrification program.

當BioAmonia 加入到廢水系統內，硝化細菌可在定殖上的絮凝物顆粒培養成適當進行硝化反應的生物量如圖1的一部分。可形成一個健康的絮狀物的微生物群落並有助於保持系統硝化的成功重要機製。





#### Application guidelines 應用指南

Key environmental factors include pH, dissolved oxygen, alkalinity, and temperature. Toxicity and solids loss can also cause nitrification inhibition. To get the optimal performance from BioAmonia, the following guidelines should be observed:

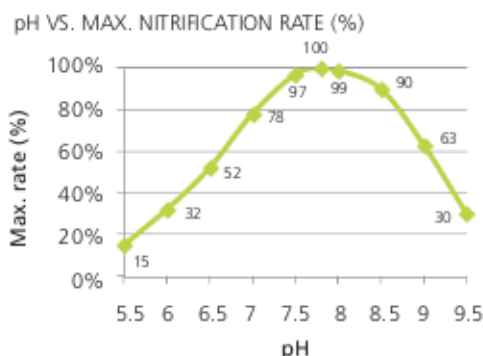
關鍵的環境因素包括pH，溶解氧，鹼度和溫度。毒性和固體的損失也會造成硝化抑制功能。為了達到BioAmonia 最佳性能，下列原則應該遵守：

#### pH

The optimal pH for nitrification is 7.0–8.5.

Nitrification can occur outside this range, but plants should adjust the pH to the optimal range for recovery and start-ups until nitrification is well established.

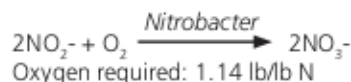
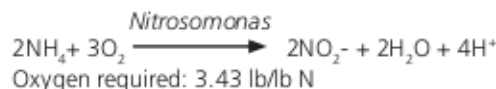
硝化作用的最適pH為7.0-8.5。硝化可發生在該範圍之外，但處理廠應調整pH值至最佳範圍，直到硝化很好且能完全恢復和建立。



#### Dissolved oxygen 溶解氧

The theoretical oxygen demand for complete nitrification is 4.57 lb per lb of nitrogen. Typically, nitrifying plants will have a dissolved oxygen concentration above 2.0 mg/L but may fully nitrify with less than that. For a recovery or start-ups, a DO >2.0 mg/L is recommended until nitrification is well established.

理論上達到完全的硝化反應需氧量為每磅氮需氧量為4.57磅。通常情況下，硝化工藝流程需求溶解氧濃度必需超過2.0毫克/升，但硝化反應也可能小於此數值。對於恢復或開始硝化反應，通常DO > 2.0 mg / L是公認硝化作用必需的數值。



Total oxygen required: 4.57 lb/lb N

#### Alkalinity 鹼度

The reaction that converts nitrate to nitrite creates nitrous acid (NHO2), which consumes alkalinity and can lower pH. Sufficient alkalinity must be present to avoid a pH crash.

化學反應將硝酸鹽轉化為亞硝酸鹽、可反應生成亞硝酸（NHO2），此反應可消耗鹼度並降低pH值。足夠鹼度必須存在可避免的pH巨變。

The theoretical demand is 7.14 lb as CaCO<sub>3</sub> per lb of N. 每磅的氮理論上需求7.14磅的CaCO<sub>3</sub>.



#### Temperature 溫度

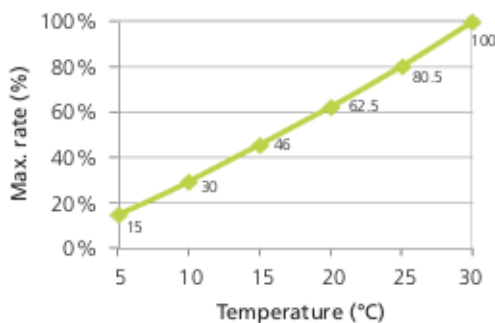
Nitrification readily occurs at 15–30 °C. As temperatures decrease below 15 °C, nitrification becomes inhibited and often fails.

硝化反應隨時出現在15-30度內。如溫度下降低於15C，硝化反應即會被抑制，進而反應會失敗。

BioAmonia is active at temperatures below 4.0 °C and can protect systems from losing nitrification.

BioAmonia 在溫度低於4.0 C 下也有相當的活力，而且可以防止硝化反應系統喪失

MAX. NITRIFICATION RATE (%)



#### Toxicity 毒性

Rapid inhibition can be caused by exposure to certain organic and inorganic compounds. Even intermittent exposure can cause nitrification disruptions.

對那些可引起接觸某些有機和無機化合物，具有快速抑制作用。甚至間歇性接觸可引起硝化反應中斷。

BioAmonia can increase a plant's tolerance to toxic compounds and actually allow it to accept higher loadings. This provides potential cost savings by minimizing off-site disposal costs for toxic waste streams.

BioAmonia可以提高水處理對有毒的化合物的耐受性，同時實際上、也允許接受更高的負荷量。這也提供了潛在的成本降低、並也大幅度地縮短有毒廢物流處置成本。

Sometimes inhibition is caused by the accumulation of compounds on floc particles where nitrifiers are colonized. The long-term exposure to these compounds can cause a steady decline in nitrification performance.

有時抑制作用發生在絮凝物顆粒的化合物的積累所引起的硝化植胚上。長期接觸這些化合物可以導致硝化效果穩定下降。

To regain nitrication, the toxic sludge often needs

Compounds which cause acute toxicity include:

- CYANIDE
- PHENOL
- CHLORINATED HYDROCARBONS
- METALS
- AMINES
- SPENT CAUSTIC WASTE

化合物引起急性中毒包括：

- 氰化物
- 苯酚
- 氯代烴類
- 金屬
- 胺類
- 廢鹼廢液

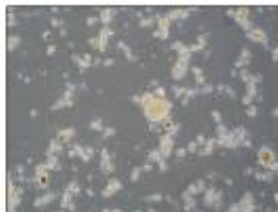
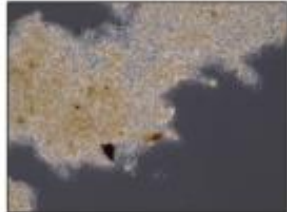
Compounds which cause chronic toxicity include:

- FLUORIDES
- SURFACTANTS
- METALS
- OILS
- LONG-CHAIN FATTY ACIDS

化合物引起慢性中毒，包括：

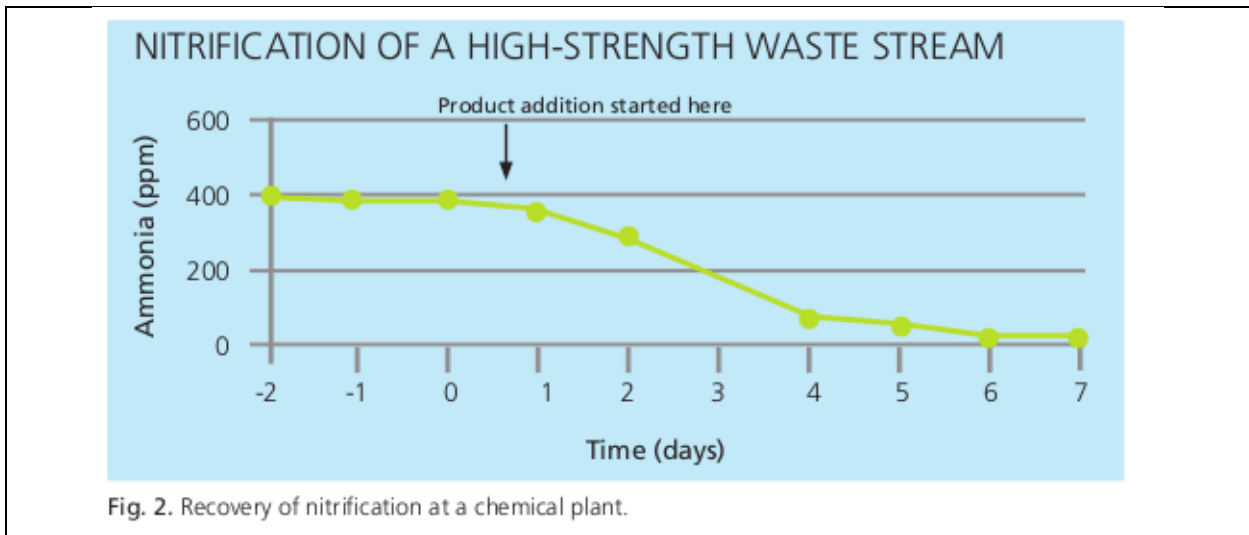
- 氟化物
- 表面活性劑
- 金屬
- 油
- 長鏈脂肪酸



<p>to be wasted from the system before using BioAmonia. Simple benchtop testing can be performed with BioAmonia to determine whether a sludge or waste stream is too toxic to support nitrification.</p> <p>重獲硝化做用反應，有毒污泥常常需要從系統中排放掉、後才可使用BioAmonia、是否對BioAmonia 的效果是否有影響、可經由簡易的測試，以確定淤泥廢物毒性是否太大而影響硝化反應。</p>	
<p><b>Solids loss 固體損失</b> Nitrification can be impacted when a large amount of solids is lost from the system. This can result from a hydraulic surge or from settling problems due to poor floc structure.</p> <p>由於不良的絮狀結構所產生的問題、或來自液壓激增。當大量固體從系統中丟失、硝化反應可受影響。</p> <p>Heavy dosing of BioAmonia can bridge the gap during the recovery period. This gap can be further shortened by using Genotech's biomass reinforcement products for improving settling and building solids.</p> <p>BioAmonia重劑量可以彌合在恢復期的差距。這個間隙可通過使用環能公司生物體、進一步縮短產品固體沉澱的功效改進。</p>	 <p>Pin floc (left) can lead to excess solids loss from the clarifier and contribute to nitrification problems.</p>  <p>Healthy floc (right) is important for consistent and reliable nitrification.</p>

**Figure 2 shows the recovery of nitrification at a chemical plant. BioAmonia was added directly to the aeration basin in decreasing quantities over 10 days to ensure a complete start-up of the nitrification process. Nitrification was achieved after just 5 days.**

圖2 顯示出在化學工廠的的硝化反應回收過程。BioAmonia直接加入到曝氣池、添加10日後、可以逐漸遞減量，如此可確保一個完整的硝化過程啟動。通常硝化反應可經過短短的5天就能實現。



BioAmonia is the fastest and most reliable biological nitrification product on the market. Figure 3 shows BioAmonia compared to a leading competitor nitrifying product. After a 24-hour bench test, BioAmonia removed 136% more ammonia than the competitor product.

BioAmonia是目前市場上使用效果速度最快和最可靠的生物硝化反應產品。圖3顯示出BioAmonia與其它競爭者的硝化反應產物。經過24小時的試驗實驗後，BioAmonia可去除比競爭對手的產品多出136%的氨。

### BioAmonia VS Competitor Nitrifiers BioAmonia與競爭對手的硝化細菌比較

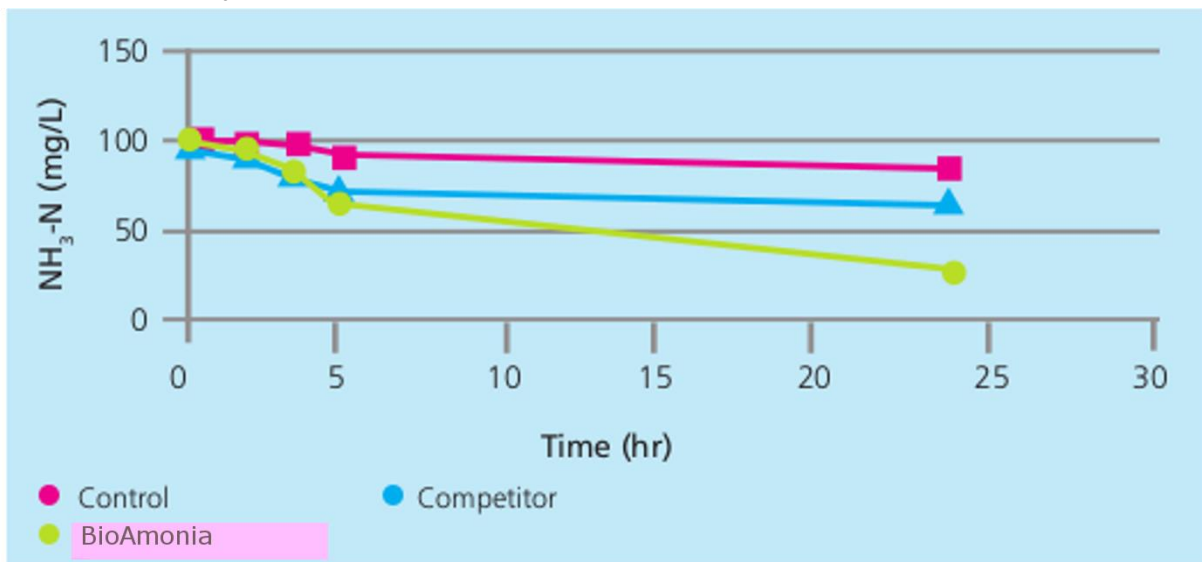


Fig. 3. BioAmonia removed 136% more ammonia compared to the competitive product.

圖3. 與競爭者的硝化反應產物相比、BioAmonia比競爭對手的產品多出136%的氨。



### Recommended use 推薦使用

BioAmonia is added directly to the influent of the aeration basin in active sludge systems or lagoons. These products have been successfully used in activated sludge plants and lagoons in refineries, food processors, renderers, municipalities, paper mills, landfills, steel plants, and chemical plants.

BioAmonia 可直接加入到曝氣池內後、排入所形成的活性污泥系統或澗湖。這些產品已經廣泛成功地、運用在煉油廠，食品加工，渲染廠，大都會市，造紙廠，垃圾填埋場，鋼鐵廠，化工廠的活性污泥處理系統和澗湖。

The dosage rate is dependent on the influent flow rate, hydraulic retention time, sludge age, and influent ammonia concentration. During an initial seeding period, an increased amount is used to quickly establish the microorganisms in the system, with lower daily dosages continuing for a week or more. The effluent should be monitored for ammonia, nitrate, nitrite, dissolved oxygen, and pH as a minimum. Additional recommended monitoring includes TKN, alkalinity, and effluent BOD.

添加劑量率取決於進水的流速，水力停留時間，污泥年齡和進水氨濃度。在初始播種添加期間，起初增加的量可用於快速建立適當微生物系統中，持續一周或更長時間的低劑量、有助於全程度硝化反應。排放的水質物如氨，硝酸鹽，亞硝酸鹽，溶解氧，pH值應被隨時監測達到最小值。其他推薦可被監測的數據也包括TKN，鹼度和污水BOD。

### Product characteristics 產品特點

BioAmonia contains Nitrosomonas and Nitrobacter species in a highly concentrated liquid. It has an ammonia removal rate specification of  $>500 \text{ mg NH}_4^+/\text{kg/hr}$  and is the industry standard for nitrifiers.

BioAmonia 包含高度濃縮的液體亞硝化和硝化的細菌物種。它有 $>500$ 毫克 $\text{NH}_4^+$ /公斤/小時的氨去除率規範，並為行業硝化細菌標準。

### Safety, handling and storage 安全性，操控性和存儲

Refrigerate BioAmonia upon receipt and throughout the period of use. Do not allow the product to freeze. Avoid excessive skin contact with liquids. Wash hands thoroughly with warm, soapy water after contact. Avoid contact with eyes.

在收到並在整個使用期限、冷藏BioAmonia。不允許產品凍結。避免過多的液體接觸皮膚。接觸後肥皂水、徹底用溫水洗手。避免接觸眼睛。