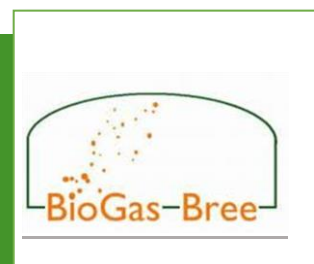


AMMONIUM SULPHATE FROM DIGESTATE BY "BIOGAS BREE" PROCESS

High N and S content drainage water from acidic washing of exhaust air
(digestate drying)



- *Keywords: Ammonia sulphate • Mineral fertilizer statute • high efficiency • Drag hose or spoked wheel application*

Key facts:

- **Focusing geographical areas:** EU28
- **Product category:** Ammonia sulphate is regarded in Flanders as a mineral fertiliser and requires no certification, derogation, nor manure transport documents. According to the current fertiliser regulation EU2003/2003 ammonium sulphate is a nitrogen fertiliser solution and recognized 'EC fertiliser' (category C1 n°1) only if the N-concentration is at least 15%. In the new Fertiliser Regulation it should be able to be categorised as a PFC 1(C)(I)(b): Liquid inorganic macronutrient fertiliser – given the technically feasible, lower N-content criteria (1,5 or 3%). However, it is not clear if an inclusion of ammonium sulphate from manure in CMC 11 (designated animal by-products for fertiliser production) in the new European fertiliser regulation is required. Finally, the Nitrates Directive defines this product as animal manure and not as mineral N fertiliser. Therefore the product has to fulfil requirements of animal manure. A European project Safemanure is currently ongoing to potentially validate EU-wide ammonia sulphate as a mineral fertiliser as well.
- **Product status:** available on the market
- **Input material:** mix of manure, organic wastes (cfr Vlarema (Flanders) and positive list FOD (B)) and/or energy maize
- **General appearance:** liquid, transparent
- **Nutrient content N-P-K:** 8% N% (fw), 25% SO₄ (fw)
- **Other micro elements:** /
- **Permit availability:** cfr supra requires no certification, derogation nor manure transport documents (Flanders)



Summary:

Biogas Bree uses a chemical air scrubber to limit ammonia emissions of the drying of (solid fraction of) digestate. Washing the exhaust air with sulphuric acid leads to the by-product: drainage water or ammonia sulphate considered a mineral NS fertiliser. Sedimentation in a storage tank allows a pure, transparent ammonia sulphate to be extracted without risking congestion at application (cfr infra). Biogas Bree's AS pH is usually between 4 and 5,5 depending on the adjustment of the acid scrubber. Although the EC of ammonium sulphate is high and the pH is fairly low, both parameters did not reduce crop yield according to several field trials. The main reason is that due to the high N concentration in ammonium sulphate compared to animal manure only low amounts are applied. Furthermore, the soil also has a buffer capacity to neutralize the potentially low pH of ammonium sulphate. Of course, attention should be taken when applying ammonium sulphate to salt sensitive crops. On the other hand there are crops that can handle high EC values of ammonium sulphate and also benefit from sulphur application (e.g.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818470



cabbages). The ammonia sulphate (AS) contains around 8 % N and 25% SO₄. This allows the AS to perfectly meet the nitrogen and especially sulphur requirements of crops, e.g. cabbage crops, lettuce, potato, onions, celery, leek, cereals, sugar beets, maize, etc. Contents of pH, nitrogen or sulphur can be further optimised by mixing with e.g. urean (classic liquid nitrogen fertilizer). Based on soil analysis results (N & S), the crop requirement and the soil type, etc. the correct dosage should be calculated. Commonly however the dosage often fluctuates around 1m³ per hectare. In order to make optimum use of its effect as a fertiliser, it is desirable to make the product very specifically available to the plant, either at the start of cultivation or in the form of additional fertilisation. In order to avoid the risk of burning during the administration of ammonium sulphate, especially in windy and sunny weather new specific application techniques are used (cfr UNIR project) such as a drag hose or spoked wheel fertilization. The Biogas Bree commodity is locally priced at around 10€/m³ ≈ 10€/ha.

How to use:

- **Type of farming:** low input, conventional
- **Cultivation methods:** open field, greenhouse
- **Recommended crops:** potato, wheat and spelt, cabbage crops, lettuce, potato, onions, celery, leek, cereals, sugar beets, maize, temporary and permanent grassland
- **Application doses:** 1m³ t/ha (depending on soil, season, crop,...)

Key product features:

- Mineral fertiliser-like
- Multi-nutrient: N(H₄) and S(O₄)
- Plant available nutrient content %: 100% N(H₄) and S(O₄)
- DM: 15-30%
- pH: 4-5,5

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Key product benefits:

- Efficient N- and S-fertilisation
- Proximity of potential origin: chemical air scrubbing from biogas installations or pig stables
- Closing material and nutrient cycle: secure source of carbon, nitrogen, phosphor, and other macro-/micro-elements

Competitive position and advantages:

- Ammonia sulphate is a low priced, high value N and S fertiliser issued from a chemical air scrubber joined at the (solid) digestate drying proces
- The ammonia sulphate from a chemical scrubber is a mineral NS fertiliser that is considered a fertiliser in Flanders. Raw material declaration, inspections, FOD exemption (B) and manure marketing documents are not required.
- Due to a historical decrease of the acidification problems and acid rain, the space for S-fertilisation has also increased again in recent years, especially since there are mainly sulphur shortages on Flemish fields and meadows. These shortages in the soil can in turn lead to too low N utilisation in the plant (and yellowing).
- optimised row fertilisation via towing hoses (drag hose system) or via a spoked wheel fertilisation - allowing efficient application without soil damage nor 'burning' of the crop, and/or preventing evaporation of the ammonia.

