

Kurita's VOXOUT® 70C reduces bisulfite contributions by 60-80%

Resulting in lower freight cost and additional savings for plant



1. Keywords

Scrubber performance, bisulfite, dry grind fuel ethanol plant,

2. Background

Kurita's process technologies team engaged in a CO₂ Scrubber performance comparison evaluation in an Eastern United States dry grind fuel ethanol plant with a 100 MMGPY nameplate. The process technologies team was requested to support initial air emissions compliance testing by the plant management team. Process technologies personnel provided an inspection of the fermentation scrubber equipment and operational procedures.

Parameters compared were:

- Compliance Reliability
- Application Cost
- Residual Bisulfite – and its impact on both yeast vitality and final product sulfur content
- Accompanying Value

Recommendations were delivered that enabled improved performance. Comparative testing was scheduled with three acetaldehyde control additives:

- VOxOUT 70C
- Commodity Ammonium Bisulfite ("ABS")
- Commodity Sodium Bisulfite ("SBS")

3. Action/Approach

The plant implemented the process technologies equipment and procedure recommendations prior to the primary engineering study. Adoption of the recommendations resulted in a 4% higher rate of ethanol recovery – even with a reduction in scrubber feed water of 95 liters per minute. During scrubber additive testing, an emission limit of 10 ppm(V) of acetaldehyde was adopted to ensure that State permit compliance was achieved. Testing over the period of complete fermentor drop cycles was performed with each additive to replicate as consistent operation as achievable.

4. Achievements

Compliance with State permit was achieved in all cases, with a 10 ppm(v) acetaldehyde target maintained throughout.

On a calculated use cost basis, the scrubber additive products performed as follows:

- VOxOUT 70C – 49k€/year
- Commodity Ammonium Bisulfite – 144k€/year
- Commodity Sodium Bisulfite – 174k€/year

The reduced volume of VOxOUT 70C resulted in lower calculated freight costs:

- VOxOUT 70C freight cost was calculated to be 77% lower than that of SBS
- VOxOUT 70C freight cost was calculated to be 42% lower than that of ABS

Residual (unconsumed) bisulfite was measured during the engineering study at corresponding points in the fermentor drop curves during application of the three scrubber additives. Residual bisulfite is not only wasted, but also adds to yeast stress and to potential sulfate carryover into final product ethanol.

Comparative average residual bisulfite values measured were:

- VOxOUT 70C ~ 10 ppm
- ABS ~ 30 ppm
- SBS ~ 55 ppm

Further, the plant placed value in the support and experience provided by EPT. Reduced volumes of VOxOUT result in lower freight cost and additional savings for plant.

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