

“ ”

(,)
가

(,)

3

1.
2. Bioscrubber

3. Bioscrubber

1.6 J/L 가 가
7.5~15

1.6~2 J/L

bioscrubber 30~50%
70~100%

(,)

가

SUMMARY

I. Title

“Development of an integrated plasma and bioscrubber system for the treatment of odorous compounds emitted from livestock industries in city of Yong-In”

II. Objectives and Importance

- Due to high cost, inefficiencies and maintenance problems, many odor treatment methods often fail to meet the demands of small-scale livestock industries.
- In most areas of the city of Yong-In, odor complaints have become a serious environmental problem because residential areas are often located close to livestock farms.
- Therefore, the development of an efficient technology is strongly required to successfully treat the odorous compounds emitted from the live stock industries.
- In this research, a novel, integrated system combining a plasma reactor and a biological scrubber has been investigated to solve the odor problem that the city of Yong-In is facing.

III. Research scope

The integrated system was developed and investigated according to the research plan with three main tasks;

1. Construct a plasma reactor and experimentally determine removal efficiencies of target odor compounds in the plasma reactor.
2. Design a bioscrubber and perform a series of experiment to observe removal efficiencies of the odor compounds.
3. Find an optimal condition to combine the plasma reactor and the bioscrubber in series.

IV. Results

- The novel plasma reactor developed in this study was able to successfully remove hydrogen sulfide, ammonia and toluene from the gas streams, implying

that it is suitable for the application of the integrated system.

- With increasing the specific energy input, the odor removal efficiency increased. However, the removal efficiency reached a maximum at the specific energy input of 1.6 J/L and higher. As a result, the plasma reactor needs to be operated in its optimum when the specific energy input of 1.6~2 J/L is applied.
- The bioscrubber alone resulted in odor removal efficiencies ranging from 30 and 50%, but the integrated system achieved high removal efficiencies of greater than 90% for hydrogen sulfide and ammonia. Therefore, it is proved that the integrated system is suitable for the treatment of air streams emitted from the livestock industries.
- When the integrated system was subjected to a high concentration of odor compounds, oxidation byproducts such as ozone generated from the plasma reactor negatively affected the biological activity of the bioscrubber. Therefore, it is required to implement methods to minimize the effects of byproducts.

VI. Application plan

- For the integrated system, every efforts were devoted to develop a novel bioreactor system and to transfer the technology to an industrial sector for commercialization.
- Therefore, the system was developed to prove a more flexibility in configuration and operation for any possible applications.
- Potential areas of applications could be various livestock industries including indoor air quality control for pigpens and stalls, livestock wastewater treatment facilities, composting facilities and others.

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