

Monitoring and Removal of Livestock Odor using Radiation

Jae Soon Kim^{1,4}, Tae-Hun Kim^{1*}, Sang-hee Jo¹, Tak-Hyun Kim¹, Seungho Yu², Kyoung-ran Moon³, Doohyun Ryoo⁴

¹Radiation Research Division, Korea Atomic Energy Research Institute, Jeongseup, Republic of Korea

²Radiation Utilization and Facilities Management Division, Korea Atomic Energy Research Institute, Jeongseup, Republic of Korea

³Department of Bioenvironmental and Chemical Engineering, Chosun College of Science and Technology, Gwangju, Republic of Korea

⁴Department of Environmental Science and Biotechnology, Jeonju University, Jeonju, Republic of Korea

*E-mail: thkim30@kaeri.re.kr

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The livestock odor is an important environmental issue to be solved, because it causes a nuisance and emotional disturbance in the form of displeasure, tension, and depression to nearby residents. The aims of this study was to investigate the characteristics of odor compounds in swine barn and livestock manure composting facility and the removal efficiencies of odor-causing compounds by radiation. The samples were collected from three different sampling places such as in- and outside of two swine farms and livestock manure composting facility (liquid manure composting). The predominant species in each selected sample site were used to estimate odor activity value(OAV). OAVs were calculated by dividing odor compound concentration (ppb) values measured from the instrumental analysis with their corresponding odor threshold values (ppb). The results showed that hydrogen sulfide (H₂S) is major odor-causing compound in all sampling sites on the basis of OAV. Volatile fatty acid (VFA) and phenol were also contributed to the swine barn odor. Methyl-mercaptan and ammonia(NH₃) were also predominant odor species in livestock manure fertilization facility. In addition, the removal efficiency of the target compounds(H₂S and NH₃) by radiation increased with increasing absorbed dose. The degradation efficiencies of H₂S and NH₃ at absorbed dose of 1 kGy and initial concentration of 50 ppm were 72% and 90.5%, respectively. The removal rate of target compounds was 100% at absorbed dose of 5 kGy. In conclusion from the experimental results, the radiation technology could be an effective method for the removal of livestock odor.

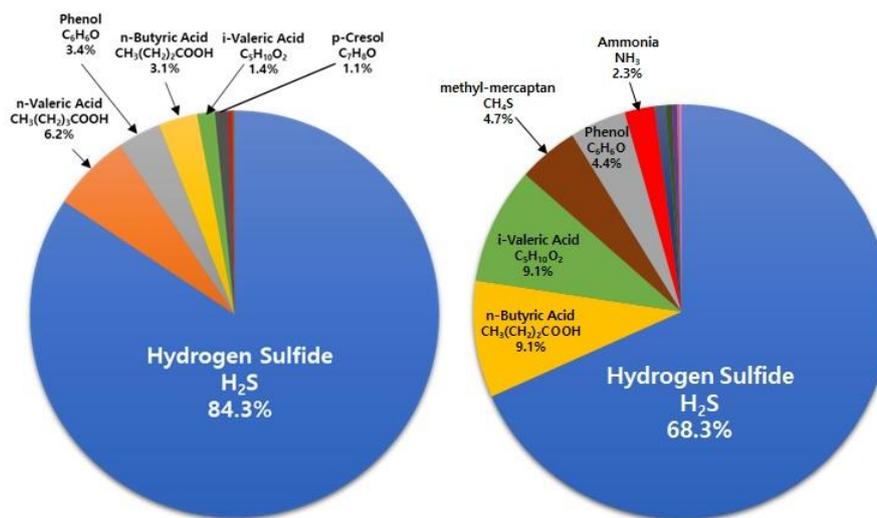


Fig. 1. Identification of predominant odor-causing compounds in swine farm (left) and livestock manure fertilization facility (light)

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