

농축산바이오매스 고온 혐기성 생분해도 평가

*허 남효, **강 호, ***이 승헌

Thermophilic Anaerobic Biodegradability of Agro-industrial Biomass

*Namhyo Heo, **Ho Kang, ***Seungheon Lee

Anaerobic digestion(AD) is the most promising method for treating and recycling of different organic wastes, such as organic fraction of municipal solid waste, household wastes, animal manure, agro-industrial wastes, industrial organic wastes and sewage sludge. During AD, i.e. organic materials are decomposed by anaerobic forming bacteria and finally converted to excellent fertilizer and biogas which is a mixture of carbon dioxide and methane. AD has been one of the leading technologies that can make a large contribution to produce renewable energy and to reduce CO₂ and other green-house gas(GHG) emission, it is becoming a key method for both waste treatment and recovery of a renewable fuel and other valuable co-products.

Currently some 80% of the world's overall energy supply of about 400 EJ per year is derived from fossil fuels. Nevertheless roughly 10~15% of this demand is covered by biomass resources, making biomass by far the most important renewable energy source used to date. The representative biofuels produced from the biomass are bioethanol, biodiesel and biogas, and currently biogas plays a smaller than other biofuels but steadily growing role. Traditionally anaerobic digestion applied for different biowaste e.g. sewage sludge, manure, other organic wastes treatment and stabilization, biogas has become a well established energy resource. However, the biowaste are fairly limited in respect to the production and utilization as renewable source, but the plant biomass, the so called "energy crops" are used for more biogas production in EU countries and the investigation on the biomethane potential of different crops and plant materials have been carried out.

In Korea, with steadily increasing oil prices and improved environmental regulations, since 2005 anaerobic digestion was again stimulated, especially on the biogasification of different biowastes and agro-industrial biomass including "energy crops". This study have been carried out to investigate anaerobic biodegradability by the biochemical methane potential(BMP) test of animal manures, different forage crops i.e. "energy crops", plant and industrial organic wastes in the condition of thermophilic temperature, The biodegradability of animal manure were 63.2% and 58.2% with 315 m³CH₄/tonVS of cattle slurry and 370 m³CH₄/tonVS of pig slurry in ultimate methane yields. Those of winter forage crops were the range 75% to 87% with ultimate methane yield of 378 m³CH₄/tonVS to 450 m³CH₄/tonVS and those of summer forage crops were the range 81% to 85% with ultimate methane yield of 392 m³CH₄/tonVS to 415 m³CH₄/tonVS. The forage crops as "energy crops" could be used as good renewable energy source to increase methane production and to improve biodegradability in co-digestion with animal manure or only energy crop digestion.

Key words : Anaerobic digestion(혐기성소화), Agro-industrial biomass(농축산바이오매스), Biogas(바이오가스), Biodegradability(생분해도), Energy crops(에너지작물), Biochemical methane potential(메탄수율)

E-mail : *bionhheo@hallasanup.com, **hokang@cnu.ac.kr, **shyi@ekr.or.kr