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Effect of ultrasonic treatment on anaerobic co-fermentation of oil refinery wastewater (ORWW) and chicken manure (CM) under different temperatures

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Now a days, the volume of industrial wastes and waster waters are being increased sharply, which made heavy pollution in the natural resources. The oil refining industry is one of the biggest manufacturing areas, which are generating the major source of aquatic environmental pollution. In numerous researches, the animal manure, as a superb nutrient pool to support microbial growth, had been used as a co-substrate to improve anaerobic co-fermentation (ACF) of industrial wastes. In the present research, the Taguchi's L9 orthogonal array was applied to study the effect of ultrasonic treatment on the ACF of ORWW and CM. Three sonicating time duration of 0 (control), 15 and 30 min were applied to treat ORWW, then treated wastewater in 3 different mixing ratios of 33, 44 and 55% were mixed with untreated fresh CM and finally fed in the batch digesters. In order to investigate the effect of temperature on the ACF, all experiments were run in 3 different temperatures of 36, 46 and 56°C. The results showed that by increasing the CM proportion in ACF mixture, the biogas production (BGP) was increased, while the temperature increasing had a negative effect on the BGP. Also, the results of ultrasonic treating oriented that by increasing sonicating time, the BGP increased. The data presented same trends for the bio-methane content of the BGP. Unlikely, the removal soluble chemical oxygen demand efficiency was not significantly affected by time duration of sonication and ACF mixing ratios.

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The design of a large-scale filamentous spore preparing device

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In fermentation industry, the mechanization level of inocula preparing procedure used to be the lowest in fermentation processes. Particularly, amplification culturing of filamentous spores are generally considered to be difficult, although they are producers of numerous compounds, such as antibiotics, organic acids, enzymes and biological pesticides. Thus, it is necessary to develop a new large-scale filamentous spore preparing device, which could decrease the labor intensity, elevate the mechanization level and improve the reliability of the inocula. Spores are usually amplification cultured by surface cultivation. For example, *Aspergillus niger* in citric acid plants in China are commonly pre-cultured in a medium composed of bran in numerous Erlenmeyer flasks, and a large amount of Erlenmeyer flasks are needed to prepare the mouldy bran. To decrease the labor intensity, elevate the mechanization degree and improve the reliability of the inocula, a new large-scale filamentous spore preparing device was designed, which contains two subsystems: The solid-state culturing subsystem and spore-separating subsystem. Solid-state culturing subsystem employed a flexible agitating mechanism which could agitate the media across a thick layer of supporting balls without touching the media and filamentous spore directly. Spore-separating subsystem employed a cyclone separator and a spore-collecting bottle. Vacuum generator could provide additional differential pressure, and pneumatic vibrator could help to collect the spores adhered to the inside wall.

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