

**EFFECT OF XANTHONE ON THE PRODUCTION OF METHANE  
FROM STARCH AND XYLAN USING MEMBRANE BIOREACTOR**

Ashri Nugrahini

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**ABSTRACT**

Food waste, such as fruit waste and food residue, has a high organic content which gives it potential as a raw material for methane production. However the presence of inhibitors in fruits makes the conversion of fruit waste into biogas a challenge. The performance of membrane bioreactor containing both free and encased cells in a single batch reactor was proposed for this work. The membrane bioreactor was compared with free cell reactor in negating the inhibition effects from xanthone on a starch and xylan medium and from mangosteen peel on methane production. For optimization, inoculum was heated to 95°C for 30 minutes in a water bath. The unheated cells (3 g) were encased and sealed in 3×6 cm<sup>2</sup> polyvinylidene fluoride (PVDF) membranes, while the heated cells (3 g) were diluted and then placed in a 120-mL bottle reactor containing the synthetic nutrient (xylan or starch and basal medium) with the addition of xanthone at a concentration of 0.3 g/L. The free-cell reactor contained 6 g of both heated and unheated cells diluted. The same configuration was applied to investigate mangosteen peel waste on biogas production. Methane production, percentage reduction of methane production, and pH levels were measured. The production of methane from the synthetic medium containing starch with the addition of 0.3 g/L of xanthone in the membrane bioreactor was similar to that of the free cell reactor, but from the synthetic medium containing xylan with an addition of 0.3 g/L of xanthone in the membrane bioreactor, it was statistically different to that in the free cell reactor. The production of methane from mangosteen peel to inoculum ratios of 1:2 and 1:4 in the membrane bioreactor was not statistically different to the free cell reactor.

**Keywords:** Anaerobic Digestion, Methane, Membrane Bioreactor, Starch, Xylan, Xanthone