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THE EFFECT OF ADDITION BY BUTHYLATED HYDROXYTOLUENE (BHT) ON PHYSICAL PROPERTIES OF GEOMEMBRANE FROM RECYCLED HIGH DENSTY POLYETHYLENE (HFPE) PLASTIC WASTE

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ABSTRACT

Recycled High Density Polyethylene (HDPE) has been prepared for geomembrane construction material. The aim of this research was to study the effect of Butylated Hydroxytoluene (BHT) addition as an antioxidant on the characteristics of the resulting geomembrane. *Fourier Transform Infra Red* (FTIR) analysis was carried out to examined functional groups of recycled HDPE and prepared geomembranes. Mechanical properties, permeability and hydrophobicity of geomembrane were observed to determined optimum BHT addition. The results of FTIR analysis on *recycled* HDPE showed the presence of functional groups at wavelengths 2912 and 2847 cm^{-1} (C-H stretching); 1474 and 1467 cm^{-1} (CH_2 bend); 721 cm^{-1} (CH_2 Rock). After being formulated with other materials to obtain geomembranes, it was not found new peak indicated that the presence of BHT in geomembrane only physical interaction occur. All of geomembranes had no permeability to water and reach 100% of hydrophobicity. The highest tensile test value was shown by geomembrane with 0,25 b/b% of BHT which about 21.235 MPa and 16.01 MPa for before and after soil burial test for four weeks, respectively. Perhaps might be due to the interaction between BHT at low concentrations which has lower polarity and HDPE which is nonpolar has better compatibility than at other concentrations

1. Introduction

(1.15 space) Fossil-based fuels as the primary energy sources in Indonesia and dominates national energy needs [1]. Up to now, however, fossil-based fuels have been considered to contribute to l enormous environmental problems-from air pollution to global warming [2, 3]. (TNR11, 1.15 space)

2. Methods (TNR 12)

2.1. Subtitle 1 (Times New Roman 11)

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This study was conducted by collecting and reviewing the available data on public platform

including journal article, books, data sets, reports, and government regulations regarding the research topic [3]. (TNR11, 1.15 space)

3. Results and Discussion (TNR 12)

3.1. Biogas Production

Typically, biogas refers to a gas mixture containing a high portion of both carbon dioxide (CO_2) and methane (CH_4) produced by a fermentation process of organic materials using bacteria under anaerobic conditions. An anaerobic fermentation process of organic material into biogas is a biological process that takes place in 4 successive stages [9, 10, 11] that is schematically presented in Figure 1 [12]. (TNR11, 1.15 space)

Table 1. The main components of biogas and its impurities [13] (TNR 11)

Components	Concentration (%)
Methane (CH_4) - main	50 - 80
Carbon dioxide (CO_2) - main	25 - 50
Nitrogen (N_2) - impurity	0 - 10
Hydrogen sulfide (H_2S) - impurity	0 - 3
Oxygen (O_2) - impurity	0 - 2
Hydrogen (H_2) - impurity	0 - 1

Figure 4. Automatic weighing system (AWS) for the preparation of biogas reference material in accordance with ISO 6142-1:2015 [26]. (TNR11, 1.15 space)

4. Conclusion (TNR 12)

The existence of three pillars of quality infrastructure in Indonesia in supporting the availability of quality biogas products has been presented. Biogas as sustainable energy may achieve security and supply of energy, improve the environment, quality of life, and foster national economic growth. Since either domestic or international biogas market is developed rapidly, better control of the biogas quality can better its utilities. With this regard, available quality infrastructures (standardization, metrology, and conformity assessment) at the national level will allow biogas producers to offer a maximum level of consumer satisfaction and safety. (TNR11, 1.15 space)

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References (TNR12)

Journal format

[1] Montuori P., Jover E., Morgantini M., Bayona J.M., and Triassi M. (2018). Assessing human exposure to phthalic acid and phthalate esters from mineral water stored in polyethylene terephthalate and glass bottles. *Food Additive Contamination A*, 25(4):511-518. https://doi.org/10.1080/02652030701551800 (if any) (Times New Roman 11).

Book format

[1] Ibn Abdulaziz, T. (2004). *Classic experiments in psychology*. Westport, CT: Greenwood.

Web Link format

[1] Rismayanti, W. (2009). Using dictogloss technique to improve students' listening ability. Indonesia: Unversitas Pendidikan. Retrieved on March 04, 2012 from: http://repository.upi.edu/skripsiview.php?no_skripsi=833.

Conference format

[1] Arem, G. L. (2006). The effects of teaching and playing experience on ability to diagnose a motor skill. In P. Brewer & Firmin, M. (Eds.), Ethnographic and qualitative research in education: Proceedings of the seventeenth annual conference (pp.1-20). Newcastle, UK: Cambridge Scholars Press.

Proceeding format

[1] Game, A. (2001). Creative ways of being. In J. R. Morss, N. Stephenson & J.F. H. V. Rappard (Eds.), Theoretical issues in psychology: Proceedings of the International Society for Theoretical Psychology 1999 Conference (pp. 3-12). Sydney: Springer.

Dissertation/Thesis

[1] Alhadhrami, GA. (1991). Effect of Preservatives and Maturity on the Nutritional Value of Alfalfa Hay for Lactating Dairy Cows. (Doctoral dissertation), University of Arizona, Tucson.