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PROCEEDING
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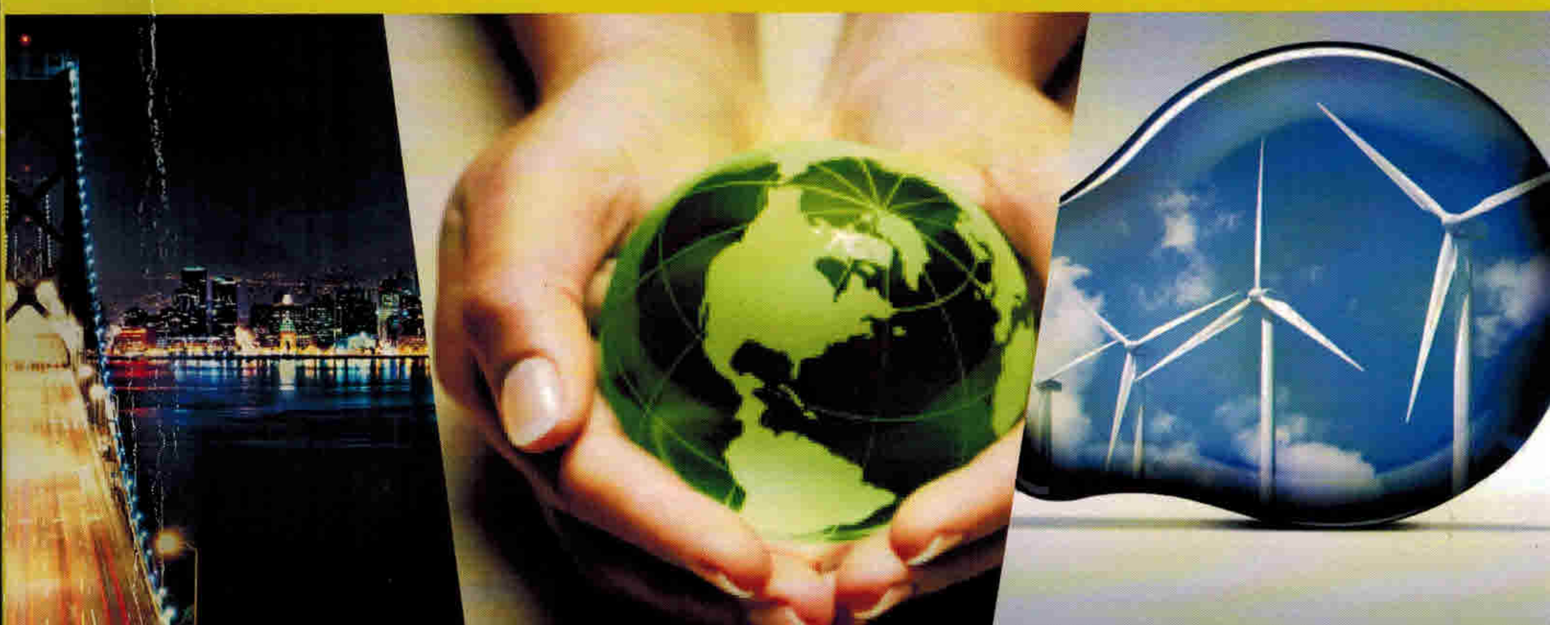

"Intellectual Property Right Based on Green Social Dynamics, Business and Science-Tech"

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PROCEEDING OF
INTERNATIONAL CONFERENCE ON GREEN WORLD IN BUSINESS AND TECHNOLOGY

"Intellectual Property Right Based on Green Social Dynamics, Business and Science-TechIntellectual Property Right Based on Green Social Dynamics, Business and Science-Tech"

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Crosscurrent Batch Leaching of Rice Husk Ash Using Distilled Water

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Abstract. Agricultural wastes such rice husk have a possibility to be used as a renewable source for production of energy, silica, and the soaking liquor in making fiber from bamboo. Ash extract of rice husk can be made by solid-liquid extraction process. Leaching or solid-liquid extraction is the removal of a soluble fraction (solute) from the solid phase. In the leaching operation, alkali, as solute, is removed from rice husk ash. The solute is measured as active alkali by titration. The solid (rice husk ash) contains solute and inerts. It needs solvent, water, to remove the solute. The objective of this research was to study the effect of ash-solvent weight ratio and the number of crosscurrent in batch leaching of rice husk ash.

Ash of rice husk (200, 250, 300, 350, and 400 g) and 1000 ml of distilled water were put into a beaker glass, stirred well during 5 minutes (assume equilibrium). After that, the mixture was filtered by Buchner funnel and vacuum pump perfectly.The volume of filtrate (overflow) was measured, and also determined the content of alkali active by acid-base titration. The residue (underflow) was added by 1000 ml fresh distilled water, mixed well and filtered again. The batch leaching operation on the underflow was repeated until 5 times.

Distilled water is good solvent for leaching of rice husk ash. The ash extract of rice husk contains potassium 84.7969 mg/L, silica 0.8255 mg/L, carbonat 12.2 mg/L, sodium 38.075 mg/L, and magnesium 5.006 mg/L.

Keywords: ash extract, crosscurrent, leaching, rice husk.

1 Introduction

Rice husks, the most abundant waste material in agricultural country, is the one of the renewable source for production of energy, and the soaking liquor (for delignification) in making fiber from bamboo. Nagrale *et al* [4] have studied about utilization of rice husk ash (RHA). There are many applications of RHA, such as aggregates and fillers for concrete and board production, a source of silicon, insulation powder in steel mills, repellents in the form of "vinegar-tar", a release agent in the ceramics industry, an insulation material for homes and refrigerants.

Other research, leaching treatment proper to extract the silica. The solvent generally used in that process are: sulphuric acid (H_2SO_4), hydrochloric acid (HCl), nitric acid (HNO3), and alkali solution [1, 2]. Beside hazardous to the environment and humans, the strong acid and base leaching treatment also has an economical problem due to a necessary use of expensive materials with corrosion resistance to strong acid and a special disposal treatment of used strong acids and base.

Ash extract of rice husk (as a soaking liquor in the delignification of bamboo) can be made by solid-liquid extraction process. Leaching or solid-liquid extraction is the removal of a soluble fraction (solute) from the solid phase [3]. In the leaching process, alkali, as solute, is removed from rice husk ash. The solute is measured as active alkali by titration. The solid contains solute and inerts. It needs solvent, water, to remove the solute. The objective of this research was to study the effect of weight ratio of ash to water, and crosscurrent number in batch leaching of rice husk ash using distilled water.

2 Materials and Method

The experiments were run in the Laboratory of Chemical Engineering, Ahmad Dahlan University. The materials consist of rice husk ash (RHA), and distilled water (as solvent). Ash of rice husk (200, 250, 300, 350, and 400 g) and 1000 ml of distilled water were poured into a beaker glass (2 Liter capacity), stirred well during 5 minutes. After that, the mixture was filtered by Buchner funnel and vacuum pump perfectly, until there was no drop again from the filter. The volume of overflow (or filtrate) was measured, and also determined the content of alkali active by acid-base titration. The underflow (raffinate or residue) was added by 1000 ml fresh distilled water, mixed well and filtered again. The leaching batch operation on the underflow (raffinate) was repeated until 5 times.

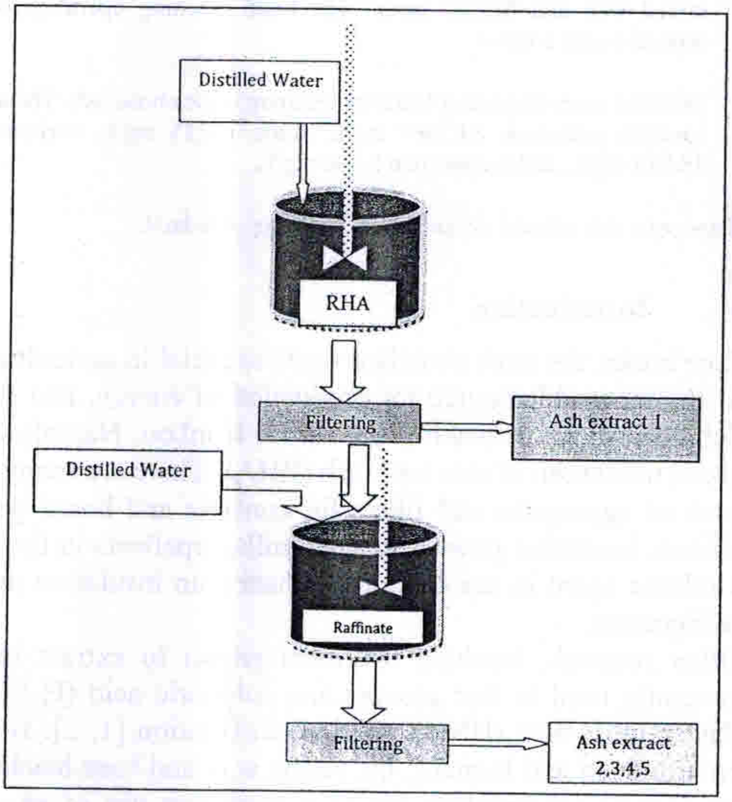

Figure 1 Crosscurrent Batch Leaching of Rice Husk Ash

3 Result and Discussion

3.1 Leaching of Rice Husk Ash

Ash of rice husk 200 g and 1000 ml of distilled water were put into a beaker glass, stirred well during 5 minutes. It was assumed that the operation will be in equilibrium after 5 minutes. The filtrate is known as ash extract, then treated analytically by acid-base titration, to evaluate the alkali concentration. The ash extract purposes to be a soaking liquor in delignification process of bamboo, so that it must be known the concentration of alkali. Generally, the content of ash extract from rice husk is shown in **table 1**. This result was determined by AAS Method in Laboratory of Balai PIPBPJK Dinas PU, and ESDM, Daerah Istimewa Yogyakarta, Indonesia.

Table 1 The Content of Ash Extract of Rice Husk

No.	Component	mg/L
1	Potassium	84.7969
2	Silica	0.8255
3	Carbonate	12.2
4	Sodium	38.075
5	Magnesium	5.006

Figure 2 shows the concentration of alkali in ash extract, as the result in each batch leaching with fresh distilled water. It shows the first batch leaching will give the highest concentration. The concentration will decreases after the second, third, fourth, and fifth batch leaching.

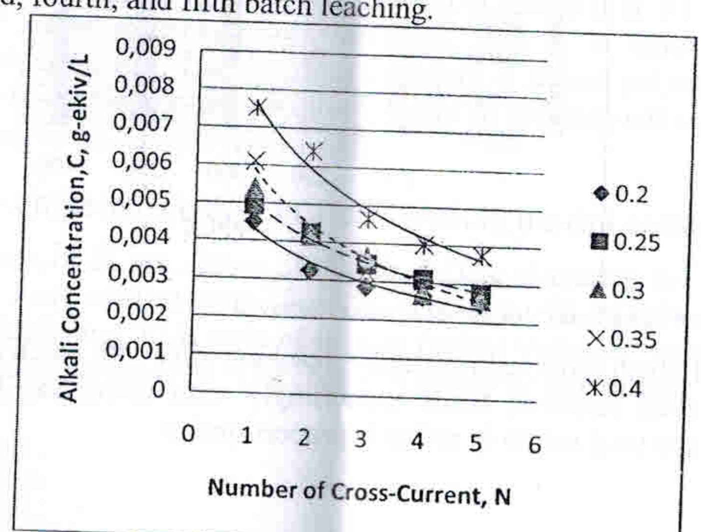

Figure 2 Concentration of Alkali in Ash Extract of RHA

Efficiency of leaching is defined as multiplication of volume and alkali concentration of extract. In figure 3, it shows that the efficiency of first batch leaching is the lowest, because water is absorbed in the pores of solids. The second leaching has the highest efficiency, 83.4% for ratio (ash/water) 0.25.

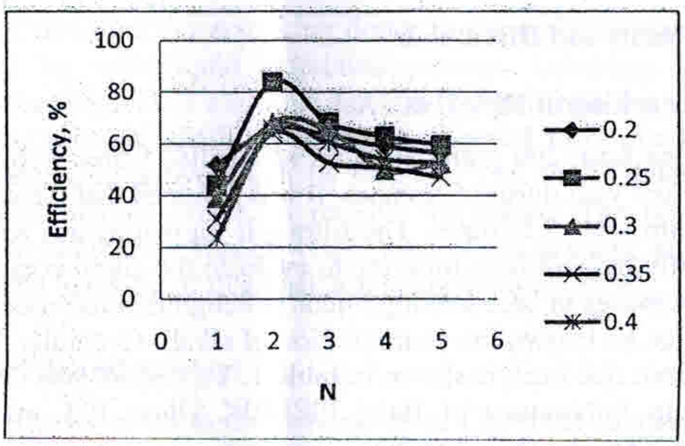

Figure 3 The Efficiency of Batch Leaching

Figure 4 shows the total volume accumulated of ash extract after fifth leaching. It demonstrates that the increasing weight of solid will decreasing the total volume accumulated. In five times leaching, it needs 5000 ml of distilled water, but the total accumulated volume of extract after leaching maximum 4474 ml, or 89.5%.

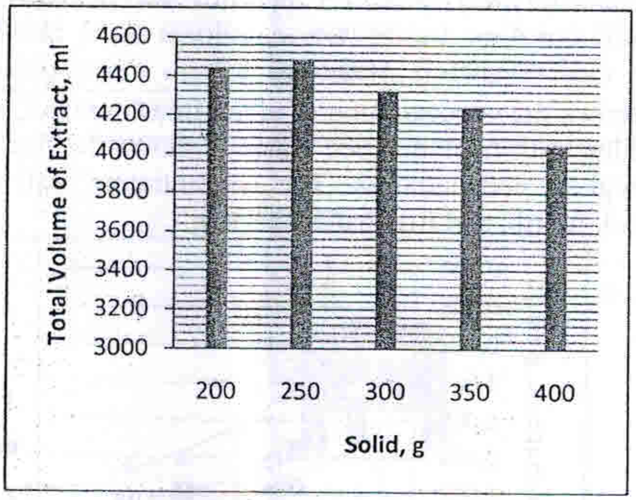

Figure 4 The Total Volume of Extract Removed

The total alkali removed from RHA leaching after fifth batch is shown in figure 5. The total removed tends increasingly with increasing the solid weight, because the total solute in solids is proportionally.

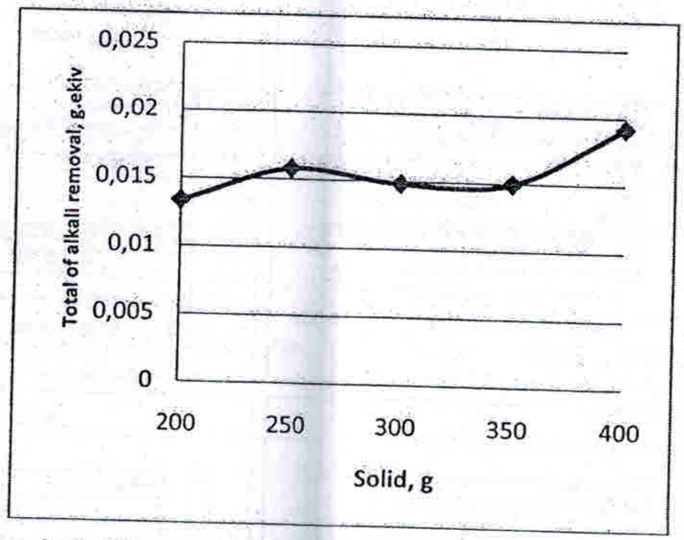

Figure 5 The of Alkali Removal in RHA Leaching

3.2 The Effect of Weight Ratio of Solid to Solvent (Ash/Water)

In its elemental form, a leaching system consists of three components: inert, solute, and solvent. Inert is insoluble solids, a solute a single nonadsorbed solute, which may be liquid or solid; and a single solvent. Thus, it is a ternary system, by virtue of the total mutual "insolubility" of two of the phases and the simple nature of equilibrium. The composition of a typical system is satisfactorily presented in the form of a diagram [3]. Those diagrams are plot of mass fraction of solvent against mass fraction of solute (Fig. 6). In figure 6, X is ratio of solute to (solute+solvent+inerts), and Y is ratio of solvent to (solute+solvent+inerts). The diagrams in figure 6 shows polynomial order 2, with R^2>0.97. Increasing weight ratio of solid to solvent will tend to increase ratio of solute to (solute+solvent+inerts).

3.3 The Effect of Number of Crosscurrent in Batch Leaching

The influence of N are shown in figure 7. The diagrams are plot of mass fraction of inert against mass fraction of solute. X' is ratio of solute to (solute+solvent), and Y' is ratio of inert to (solute+solvent). Increasing N will increase total solute removal. The chart represents by logarithmic function with $R^2 > 0.89$.

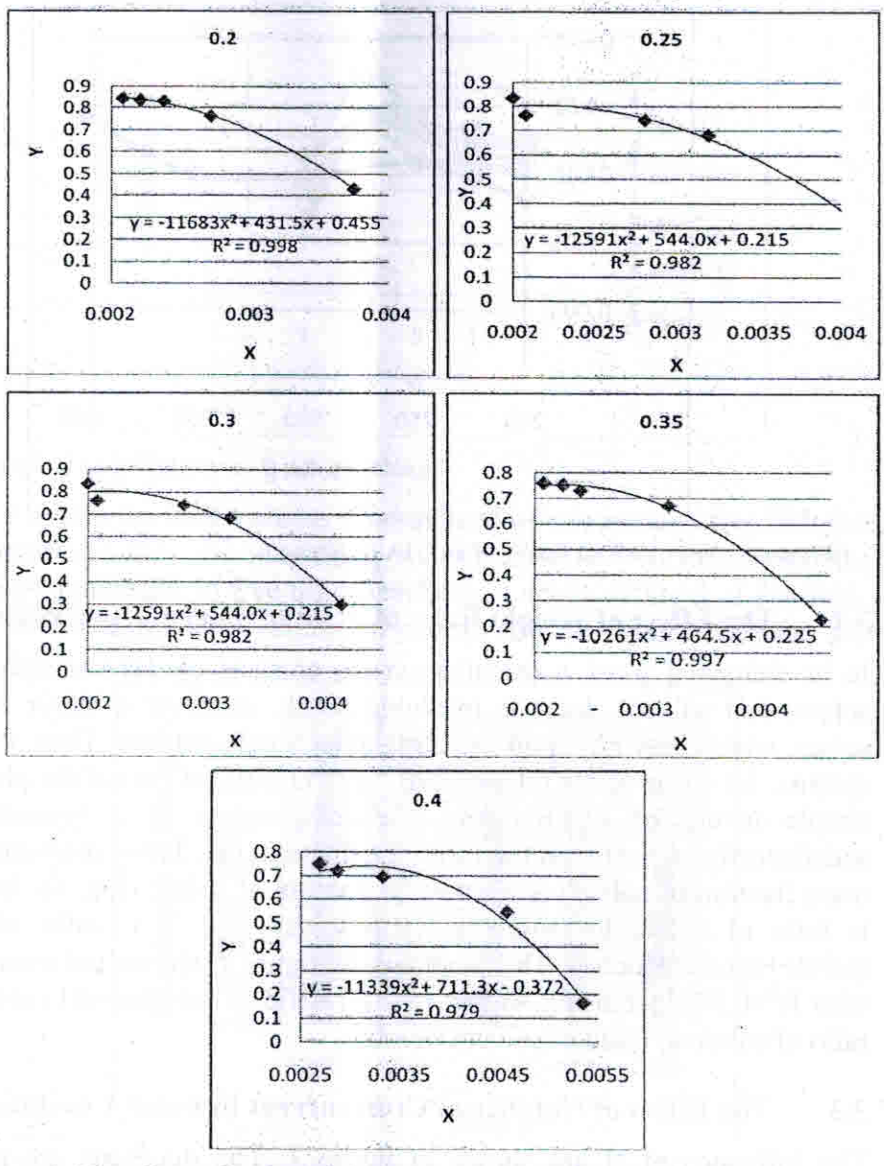

Figure 6 Plot of mass fraction of solvent against mass fraction of solute

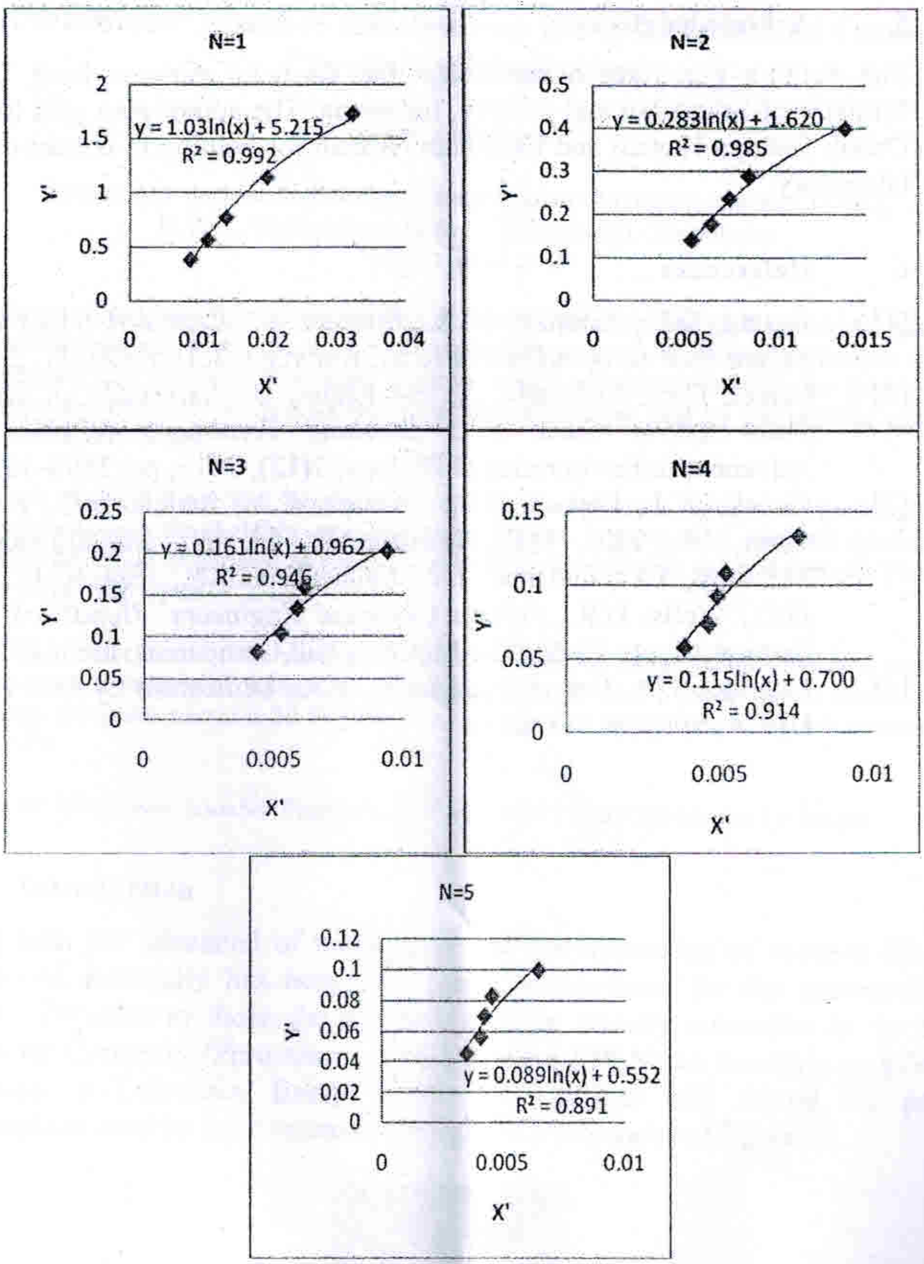

Figure 7 Plot of inert mass fraction against solute mass fraction

4 Conclusion

Distilled water can be used as solvent in leaching of rice husk ash. In the batch crosscurrent method, weight ratio of ash to water influence the result (alkali removal) and efficiency. The number of current also effect the alkali removal. The best performance is weight ratio (ash/water) = 0.25 and N=2, give efficiency 83.8%.

5 Acknowledgement

The authors gratefully acknowledge the financial support from DIKTI in Ministry of Education and Culture, Indonesia. The author also glad to thank to Denok Rahayu Hastuti and Fatchatun Ni'mah for helping to collect data in the laboratory.

6 References

[1] Agung, G.F., Hanafie, M.R., Mardina P., *Ekstraksi Silika dari Abu Sekam Padi dengan Pelarut KOH*, Konversi, **2(1)**, pp.28-31, 2013.

[2] Faizul, C.P., Abdullah, C., and Fazlul, B., *Extraction of Silica from Palm Ashvia Citric Acid Leaching Treatment*, AENSI Journals, Advances in Environmental Biology, **7(12)**, 2013, pp. 3690-3695, 2013.

[3] Genck, W.J., Dickey, D.S., Baczek, F.A., Bedell, D.C., Brown, K., Chen, W., Ellis, D.E., Harriott, P., Li, W., McGillicuddy, J.K., McNulty, T.P., Oldshue, J.Y., Schoenbrunn, F., Smith, J.C., Taylor, D.C., Wells, D.R., *Perry's Chemical Engineers' Handbook* , 8th ed., Section 18, pp. 59-66, The McGraw-Hill Companies, Inc., USA, 2008.

[4] Nagrale, S.D., Hajare, H., Modak, P.R., *Utilization Of Rice Husk Ash*, IJERA, **2(4)**, pp. 1-5, 2012.