



## STUDY ON THE ASH COMPOSITION OF *Albazia Falcataria*

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### ABSTRACT

Search environmentally energy sources to reduce the impact of global warming is being done. The Government of Indonesia through SMRTI 2006 was developing and implementing science and technology fields of new and renewable sources of energy to support the security of energy supply in 2025 for the next of human survival. Biomass is a one of renewable energy. In this research, Sawdust Of *Albazia Falcataria* as solid fuel was investigated using SEM-EDAX to know the composition for preventing damage in heat exchanger. Problems in heat exchanger are slagging and fouling caused by biomass burning. The investigation of *Albazia Falcataria* were contains S, K before burning 0,27%, 0,56% and 0,49%, 0,82% for ash respectively. By using biomass energy as solid fuel decreased usage of fossil fuel to diminish global warming effect and sustainability of the earthlife

### Keywords

*Albazia Falcataria*; Renewable energy; Ash; biomass;

### INTRODUCTION

Biomass as fuel was investigated by several researcher, they found that there were slagging and fouling when using biomass combustion in Boiler system. (Liao C 2007,88) (Giron RP 2012, 26(3)). Biomass was potential resources of energy because they can grow fastly than fossil fuels. They can be as balancer in the world, use CO<sub>2</sub> to grew up and release O<sub>2</sub>. This research goal was to identified the element contains of *Albazia Falcataria* as solid fuel.

### MATERIAL AND METHOD

Fresh sawdust of *Albazia Falcataria* was collected from local sawmill business at Lumajang State, East Java Provincy, Indonesia.

Investigation using SEM-EDAX conducted at Central Laboratorium, Physics

Department, Mathematics and Natural Science Faculty, State University of Malang by compare fresh sawdust of *Albazia falcataria* and the ash from reactor combustion. Reactor temperature set to 900 ° C as similar to commons boiler (Konsomboon et al. 2011).

### RESULT AND DISCUSSION

Combustion of biomass released amount of Cl and S, also alkali metals such K and Na. It shows in table 1 that percentage of Sulfur (S) and Potassium (K) increased from 0.27% to 49% and 0.56% to 0.82% respectively. Potassium primally exist as KCl<sub>(g)</sub> and KOH<sub>(g)</sub>, while Sulphur and Chlorine are present as SO<sub>(g)</sub> and HCl<sub>(g)</sub>. There was Chlorine in the combustion of *Albazia Falcataria*, it means KCl compound will be established during *Albazia Falcataria* combusted. With decreasing temperature KOH<sub>(g)</sub> is converted to K<sub>2</sub>SO<sub>4(g,s)</sub> and K<sub>2</sub>CO<sub>3</sub> by gas phase reaction, while KCl<sub>(g)</sub>

condensed as  $KCl_{(s)}$ . According to chemical equilibrium all sulphur should be bond as solid  $K_2SO_4$  (Christensen 1995).

Table 1. Element Contains in Fresh Sawdust of Albazia Falcataria and The Ash

Element	Fresh Sawdust		Ash	
	Wt%	At%	Wt%	At%
C	10.54	18.74	54.53	62.15
O	35.25	47.05	43.15	36.93
Na	02.81	02.61		
Mg	02.00	01.76		
Al	01.82	01.44	00.38	00.22
Si	14.06	11.07		
P	01.36	00.94	00.23	00.10
S	00.38	00.25	00.27	00.12
K	02.93	01.60	00.56	00.20
Ca	24.55	13.08	00.51	00.17
Fe	03.80	01.45		
Cl			00.35	00.14

Source: Independent experiment

## CONCLUSION

Result from this experiment shows that Sawdust of Albazia Falcataria has potential properties as solid fuel but it must be reduced and controlled S, Cl and K

By using biomass energy as solid fuel will decreased usage of fossil fuel to diminish global warming effect and sustainabilty of the earthlife.

## REFERENCES

- Christensen, K.A., The formation of submicron particles from the combustion os straw, Ph.D Dissertation, Department of Chemical Engineering , Technical University Of Denmark, 1995
- Konsomboon, Supatchaya, Suneerat Pipatmanomai, Thanid Madhiyanon, and Suvit Tia. 2011. "Effect of Kaolin Addition on Ash Characteristics of Palm Empty Fruit Bunch ( EFB ) upon Combustion." *Applied Energy* 88 (1). Elsevier Ltd: 298-305. doi:10.1016/j.apenergy.2010.07.008.
- Giron RP, Suarez Ruiz I, Ruiz B, Fuente E, Gill RR, Fly ash from the combustion of forest biomass (Eucalyptus globulus bark) a biomass boiler system, composition and physico-chemical properties, *Energy Fuels*, 2012(26), 1540-56
- Liao C, Wu C, Yan Y, The characteristics of inorganic elements in ashes from a 1 MW FCB biomass gasification power generation plant, *Fuel Processing technology*, 2007(88), 149-56