

**ESTIMATION OF EMISSION FACTORS OF
SIZE-FRACTIONATED PARTICULATE MATTERS (PM_s)
BOUNDED METALS FROM RICE STRAW BURNING
SIMULATION IN AN OPEN-SYSTEM COMBUSTION
CHAMBER**

UNDERGRADUATE FINAL THESIS

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ABSTRACT

Biomass burning is a common activity in agricultural sector, it includes the open burning of rice straw from rice production waste to dispose crop residue. The burning of rice straw emits potential amount of various size of Particulate Matter (PM) or size-fractionated PMs bonded with metals. This activity has a lot of potential effects to harm the air quality that leads to various illnesses such as respiratory and cardiovascular illnesses. Rice straw samples were collected from rice field in Padang, West Sumatra, Indonesia. An open-system combustion chamber connected with Nanosampler was designed to perform the burning of rice straw simulation to calculate the emission factors of size-fractionated PMs. The metals bonded in size-fractionated PMs was determined using Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES) equipment. Emission factors (EFs) of size-fractionated PMs from rice straw with 11.11% moisture content burned in an open-system combustion chamber were 0.302 g/kg for $PM_{>10\mu m}$; 2.987 g/kg for $PM_{2.5-10}$; 10.991 g/kg for $PM_{1.0-2.5}$; 2.933 g/kg for $PM_{0.5-1.0}$; 0.166 for $PM_{0.1-0.5}$ and 1.308 for $PM_{<0.1\mu m}$. The average emission factors (EFs) values of metals present in the composition of PMs from rice straw burning in descending order were $Ca > Na > K > Fe > Li > Zn > Mg > Bi$. Ca was the most abundant metal element accounted 81.91% of total eight elements. EFs values obtained in this research can be useful for emission inventory purpose to model air pollution control.

Keywords: Biomass Burning, Emission Factors, Metals, Rice Straw Burning, Size-Fractionated PMs

