CHAPTER 4

CONCLUSION

This study provides useful information on the emissions of PM10 and ions from biomass burning especially rice straw, maize residue and leaf litter based on the burning experiments in the chamber. The EFs of PM10 emitted from all types of biomass burning were 0.69-1.52 g/kg. The highest EF of PM10 was emitted from forest leaf litter burning. The EFs of K^+ (47-86 mg/kg) and Cl^- (46-79 mg/kg) were the dominant ions emitted from rice straw and maize residue burning. This finding was probably related to the use of fertilizers and herbicides in the agricultural land. In case of water-soluble ions, the highest EFs of individual water-soluble ions emitted from all types of biomass burning were CH_3COO^- (204-302 mg/kg) and NO_2^- (84-208 mg/kg). Source of CH_3COO^- might be from biomass burning and primary emissions from vegetation and soil. NO_2^- may be from the reaction of NO_2 and NO emitted from biomass burning in the water. The highest gas emitted from biomass burning in PM10 and water-soluble samples was CO, followed by NO_2, NO and SO_2.

The PCA results based on ion contents of PM10 from biomass burning in the chamber and ambient PM10 collected in the dry season were compared. It was found that the PCA of PM10 samples from biomass burning in the chamber showed high loadings of K^+ and Cl^- indicating biomass burning. The PCA result of ambient air during dry season (2010) showed high loadings of K^+, which is the biomarker of plant burning. Therefore, it can be concluded that biomass burning affects air quality in this area.

The emissions rates (ERs) of PM10, PM10-bound ions and water-soluble ions from open burning in Chiang Mai Province in 2010 and 2011 were estimated. The highest emission of PM10, PM10-bound ions and water-soluble ions in 2010 and 2011 was from forest burning. However, the emission in 2010 was much higher than that in 2011.

Based on the result of the PCA of dry and wet depositions, it was found that high loading of K^+ was found in component 1 in the dry season. It can be concluded that biomass burning influences to atmospheric acid deposition during dry season in this area.

Recommendations for future work

In order to improve quality of data concerning emissions of pollutants from biomass burning, the following points are suggested**.**

1. More biomass types such as sugarcane and separation of tree parts (twig, wood, leaf) or tree type should be considered for burning experiment to gain more information on emissions of biomass burning.
2. Increase number of sampling sites for biomass sample collection might be required for gain a better representative values of emission.
3. The amount of burned biomass in the combustion chamber should be tested in order to confirm values of emission factors.
4. The condition of burning experiment in the chamber should be strictly controlled. The emissions were found to be varied with changing of temperature, flow rate of intake air and moisture content of biomass.
5. More replications of burning experiment for each biomass type should be considered to get a good precision.