CHAPTER 4

Conclusion

The AOSD was developed in response to its simplicity, cost effectiveness and efficiency for determination of ozone in ambient air. The principle of method is based on the ozone collection on filter paper coated with mixed absorbing solution (a mix of $NaNO_2$, Na_2CO_3 and ethylene glycol). The device consists of the 2-stage filter pack connected to a plastic tube, air flow meter and pump, respectively.

Efficiency of the active sampling device for ozone sampling in ambient air was tested by comparing with the standard method measured by chemiluminescence technique at the AQM station of the PCD, Chiang Mai, Thailand. The AOSD was tested by varying concentrations of the absorbing solution and air flow rates for the optimum conditions for ozone sampling in wet season with low ozone concentrations (<35 ppbv) and in dry season with middle ozone concentrations (30-70 ppbv) and higher ozone concentrations (>70 ppbv). The optimum conditions for ozone sampling in wet season (ozone <35 ppbv) were 0.5% $NaNO_2$/ 0.5% Na_2CO_3/ 5% ethylene glycol of absorbing solution and 1.2 L/min air flow rate, while those in dry season (ozone 30-70 ppbv) were 0.75% $NaNO_2$/ 0.75% Na_2CO_3/ 7.5% ethylene glycol of absorbing solution and 0.5 L/min air flow rate and in dry season (ozone >70 ppbv) were 1.25% $NaNO_2$/ 1.25% Na_2CO_3/ 12.5% ethylene glycol of absorbing solution and 0.5 L/min air flow rate. However, concentrations of absorbing solution have to be appropriated with ozone concentrations in ambient air, while air flow rate was adjusted conversely with the ambient ozone concentrations. Statistical analysis showed no significantly difference ($p > 0.05$) between both methods. Therefore, the developed active ozone sampling device has been proved for its efficiency for ozone measurement under varying ozone concentrations. It was comparative with a standard automatic device.

Relationships between ozone concentrations obtained from the developed AOSD and meteorological data (i.e. solar radiation net radiation, temperature, wind, pressure,

relative humidity and rain) obtained from the same AQM station was tested. Ozone concentrations were well correlated with solar radiation, net radiation, temperature and pressure. Those mentioned parameters are important factors affecting ambient ozone concentrations because the radiation and temperature are responsible for ozone formation (Khoder *et al*., 2009). Ozone concentrations in ambient air increases with increase in the solar radiation and temperature in clear day. Moreover, pressure plays important role in accumulation or transportations of ozone and ozone level in the air (Hassan *et al*., 2013).