CHAPTER I

INTRODUCTION

1.1 Overview

Aerosols are small solid or liquid particles, which have been suspended in the air and influence on the atmospheric energy budget through both of direct and indirect effects. The direct effect refers to the processes of scattering and absorption of radiation and theirs subsequent influencing on planetary albedo and the climate systems. The indirect effect refers to the acting as cloud condensation nuclei, which effect on a cloud droplet concentration and the resulting increase in cloud albedo, as well as effect precipitation rate and a lifetime of cloud. Airborne aerosols have significantly effected on human health. They can penetrate the respiratory system and deposit on the airway surface. In addition to, aerosols are also linked to the problems of visibility and acid rain.

Nevertheless, aerosol can either be produced by ejection into the atmosphere or from physical and chemical processes within the atmosphere. The sources of aerosol are both of natural and human activities. Most of the highest aerosol concentrations are usually found in urban areas. In the current, an airborne particle is a pollution problem in many cities and Bangkok. From the study of health effects of particulate matter air pollution in Bangkok by Pollution Control Department (1998), the result suggested that PM10 (particle matter with 10 micron in aerodynamic diameter and smaller) concentration in Bangkok effected on daily mortality. In addition, hospital admissions for respiratory and cardiovascular illnesses were higher when PM10 concentrations were higher. According to the measurement of airborne particle matter by Pollution Control Department in 2003, which has been found that the Bangkok metropolis sometimes had concentrations of 24 hours PM10 average exceeded than the 24 hours air quality standard. The Thai air quality standards for PM10 are average based on 24 hour not

exceed 120 μg/m3 (Pollution Control Department, 2004). Subsequently, the PM10 concentration in 2004 has been evidently increasing whereas compared to the previous year (Pollution Control Department, 2005) as shown on Appendix A.

Aerosol concentrations will vary significantly with location and time, which is depending upon some factors such as the atmospheric conditions and presence of local sources.

This thesis is composed of 5 chapters. Chapter I is about objective, scope and data analysis of this study. Chapter II is the introduction about aerosols such as production, properties, removal, effect and measurement. Chapter III is the methodology of this study. Chapter IV is the results and discussions. Chapter V is the conclusions and recommendation of this study.

1.2 Objective

- To study the variation of aerosol with time during 2003 – 2004 in Bangkok
- To obtain the time variation pattern of aerosol in Bangkok.

1.3 Scope of the Study

First, the study of time variation of aerosol in Bangkok focused on optical properties of atmospheric aerosols by the investigation value and variation of aerosol optical thickness (AOT) at 500 nm wavelength, Angstrom exponent that obtained from 440-870 nm wavelength and also volume size distribution. The data has been derived from a measurement of the ground-base Aerosol Robotic Network (AERONET) using automatic sun and sky scanning radiometers (CIMEL) during 2003-2004 at Chulalongkorn site in Bangkok and other sites in Thailand such as Omkoi, Mukdahan, Pimai, and Huahin.

Secondly, to study the variation with time of the PM10 concentration at Nonsi Vitthaya School in Bangkok by analysis PM10 time series. This data has been measured with PM10 beta attenuation monitor automated dust measuring instrument during 1997-2004 by Pollution Control Department.

1.4 Data Analysis

The data analysis has been focused on some aspects as follows;

1. The variation with time of AOT and Angstrom's exponent in term of daily average, monthly average values and seasonal frequency histogram as well as the seasonal average aerosol volume size distribution.

2. The variation with time of AOT and meteorological data such as daily average daytime temperature, wind direction and speed at 850 hPa and 3 hours accumulated rainfalls in the same periods.

3. The relationship between daily average data of PM10 and AOT

4. The PM10 time series.