



CHAPTER I

INTRODUCTION

1.1 Rationale of the Study

Polynuclear Aromatic Hydrocarbons (PNAs) are organic pollutants that occur from pyrolysis or incomplete combustion of organic material.

The Environmental Protection Agency of United States (U.S. EPA) have selected them as priority pollutants because they are carcinogenic and/or mutagenic pollutants, and harmful to human health (Figure 1-1).

PNAs enter the environment largely from volcanoes, forest fires, residential wood burning, and automobile and truck exhausts. Mobile sources are often the major contributors to PNA released to the atmosphere in urban or suburban areas (Baek *et al.*, 1991).

PNAs are emitted by motor vehicles in the vapor phase at high temperatures and adsorbed on particulates immediately when the temperature decreases. Particulate PNA can travel long distances and have long life in environment before they are removed through washout in rainfall or settle out under gravity, thereby contaminating water and soil and providing other possible routes for human exposure. Under the meteorological conditions such as temperature, relative humidity etc., gaseous pollutants ; SO_x , NO_x , O_3 react with PNA and produce derivatives of PNA that have more toxicity than parent PNA.

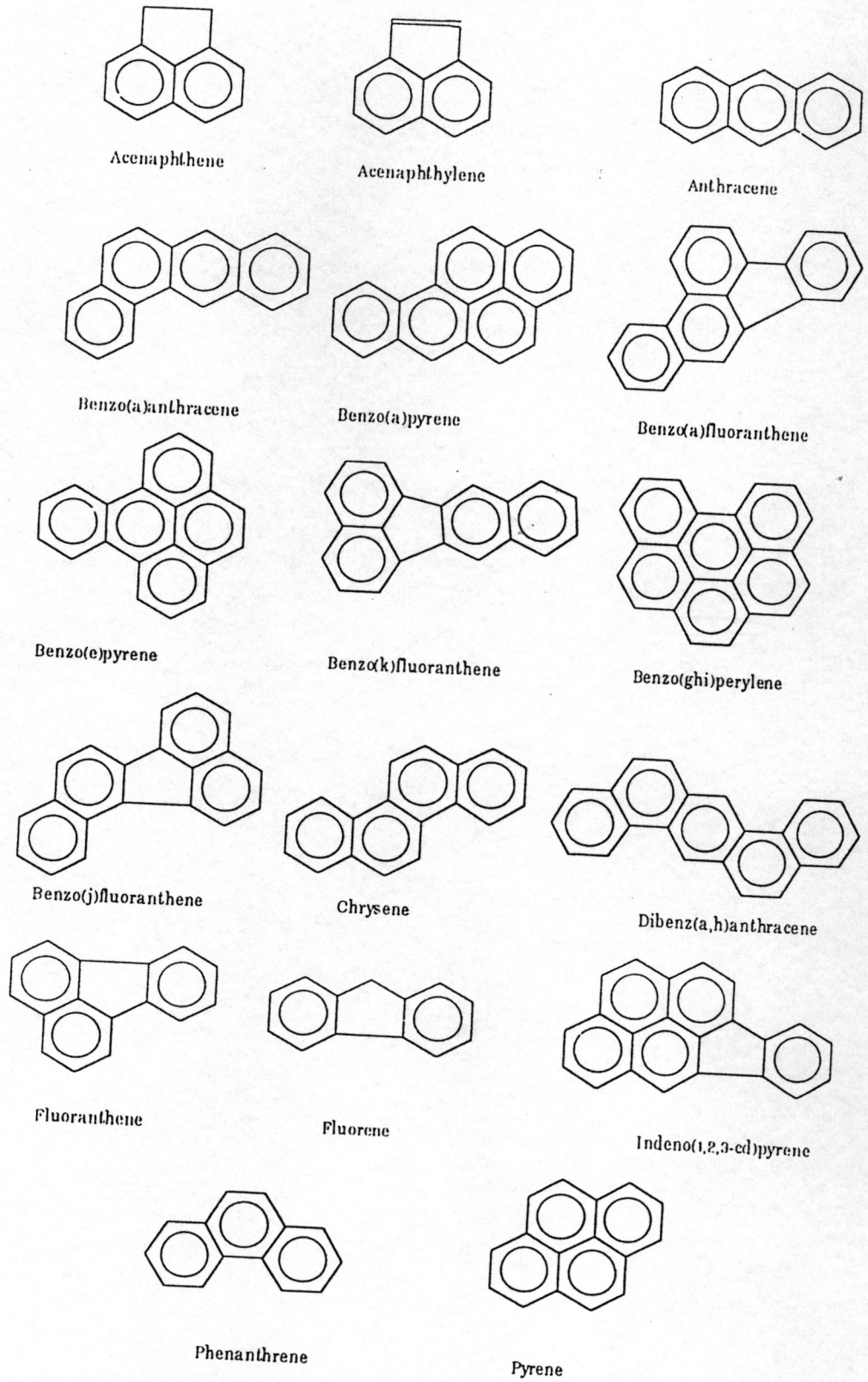


Figure 1-1 Structure of Selected PNAs

Vehicular traffic is one source of suspended particles or aerosols. This material comes primarily from tire, brake, roadway wear, and the actual vehicular emissions. The particles directly emitted by vehicles become airborne immediately and then undergo a settling and dispersion process. Some of these particles will settle on the roadway surface along with most of the materials which blow from open trucks. This deposited material is then resuspended by passing vehicles until it is eventually carried from the roadway by wind or rain.

Recently, Bangkok has a serious problem about intensity of traffic and has total suspended particulate matter (TSP) in ambient exceeding that specified in the regulations of Thailand (0.33 mg/m^3 of Air, 24 hr average).

1.2 Hypothesis of the Study

The types of roadside PNAs in Bangkok may be more than that of the off-road site. They may correlate with the total suspended particulate matter and meteorological parameters.

1.3 Objectives of the Study

1. To investigate the types and quantities of PNAs in airborne particulates in Bangkok metropolitan at roadside and off-road sites.
2. To investigate the correlation between PNAs and Total Suspended Particulate matter (TSP) in ambient air.
3. To study the influence of meteorological parameters such as relative humidity, temperature, etc., to PNA.
4. To compare the obtained amount of PNAs with the previous amount of PNAs.

1.4 Scope of the Study

Investigation of the identity and quantity of selected PNA in airborne particulates using a standard Hi-Volume air sampler for 24 hours at roadside and off-road sites in Bangkok during February- April, 1996.

Study of the relationship between PNA and TSP, meteorological parameters such as temperature, relative humidity etc.,

1.5 Anticipated benefits

The study of PNA in roadside and off-road site in Bangkok has the following expected benefits.

1. To be the preliminary data for actual PNA in atmosphere of Bangkok, to observe toxicity to humans and to compare with the regulation of other countries.

2. To be used as data support to set the regulation of PNA for Thailand in the future.