CHAPTER 9

SUMMARY OF CONCLUSIONS

The various air suspended particulate matter samples collected from different sites of Tamilnadu through infrared spectroscopic technique indicates the presence of Quartz, Calcite, Kaolinite, Pyrophyllite, Vermiculite, Smectite, Palygorskite, Sepiolite and some more minerals. The order of amount of major minerals like quartz, hematite and feldspar are determined as Vehicular Area > Industrial Area > Residential Area. Moreover, from the crystallinity index value, the average value is higher at residential area implies that the crystalline nature of quartz is poor and it is lower at vehicular area shows the existence of well ordered-quartz. As the minerals quartz and hematite are harmful to the human beings and the deciding factor for pollution, the Vehicular Area is considered as the most polluted Area.

The XRD results are complementary in character to agree with the FTIR analysis. The poor crystalline nature might the reason for the absence of few minerals in XRD analysis. Mineral characteristics observed both in FTIR and XRD studies have shown the consistency in respect of their compositions and affiliations.

The elements Si, Mg and Ca have the higher concentration than other elements in residential, Industrial and vehicular areas. The vehicular area has a higher concentration than other areas. The element Si has found to be the main factor in causing the serious ecological risk of the air. The vehicular activities are engaged with transport and anthropogenic activities. The High mobility of Si, Mg and Ca are coupled with its heavy load in the air...
poses a serious environmental concern. The element Pb has lowest enrichment and Si has the highest enrichment in all the studied areas.

The collected dust samples present a strong magnetic signal taking into account the short time collection. The overall average values of $\chi$, ARM and SIRM are $471.0 \times 10^{-8}$ m$^3$ kg$^{-1}$ and $675.1 \times 10^{-6}$ A m$^2$ kg$^{-1}$ and $61.5 \times 10^{-3}$ A m$^2$kg$^{-1}$, respectively. The order of the amount of magnetic concentration (according to concentration dependent magnetic parameters) are vehicular areas > industrial areas > residential areas. Ferrimagnetic minerals (magnetite) dominate the global magnetic signal, but it is also observed evidence of another magnetic phase corresponding to antiferromagnetic (hematite) minerals. The magnetic values are higher at the residential area indicates the influence of both vehicular and small scale industries around those sampling sites.

According to chemical composition, size and shape, the vehicular area are more toxic than the other studied area. These types of particles occur not only as an individual particle, but also in aggregate form as agglomerates of similar-sized particles and individual large particles carrying several smaller attached particles.

Among the all correlated parameters, the correlation between the distributions of feldspar, calcite, S – Ratio, $H_{CR}$ and the crystallinity index shows the better correlation in vehicular area, residential and industrial area. The positive correlation of Pb, Mn, Fe and Al and crystallinity index in the vehicular area, the better correlation of Na, Pb, K, Al, Ca, Mg with crystallinity index in residential areas and the crystalline nature is positively correlated with Pb and Si in the industrial area. In Vehicular area, the first cluster was predominant and characterized by magnetic dependent parameters. The middle cluster was elemental measurement parameter and the
third cluster was again mainly both magnetic and elemental with average positions of the other variables in Vehicular area and residential area.

From the overall observations, it is concluded that the vehicular area in Tamilnadu, India is considered as highly polluted area than the industrial and residential area. However, at some sampling areas, the trend is different due to the influence of nearer anthropogenic sources. Therefore minimising or even controlling the growth of vehicle population would pave a great way to the healthy future.

Air pollutants from cars, trucks and other motor vehicles are found in higher concentrations near major roads. People who live, work or attend school near major roads appear to have an increased incidence and severity of health problems associated with air pollution exposures related to roadway traffic including higher rates of asthma onset and aggravation, cardiovascular disease, impaired lung development in children, preterm and low-birth weight infants, childhood leukemia, and premature death.

Research findings indicate that roadways generally influence air quality within a few hundred meters – about 500-600 feet downwind from the vicinity of heavily traveled roadways or along corridors with significant trucking traffic or rail activities. This distance will vary by location and time of day or year, prevailing meteorology, topography, nearby land use, traffic patterns, as well as the individual pollutant.

There are a number of approaches that appear for reducing the air pollution near roadways. In addition to reducing vehicle emissions, other approaches involve the design of transportation projects and designs of buildings and facilities near major roadways. For example, research suggests that sound walls, cut sections, and roadside vegetation can reduce traffic-
related air pollutants immediately downwind of a roadway, although the extent of this reduction can vary by the dimension and type of feature. There are simple steps you can take in your everyday life to help improve air quality. Individuals can also make a difference in the effort to reduce pollution from cars and trucks.

**Future work**

It is planned to extend this research work to the next level in future by collecting the samples in seasons wise like, spring, summer, autumn and winter which are to be analyzed by FTIR, SEMEDX and magnetic analysis through which one can concern how particulate matter will involve for climate change. The combined work may be done with Tamil Nadu Pollution Control Board. The extension work may include other major cities of all the states or capitals of all the state in India with additional analyses like ICP-AES, Gamma ray spectroscopy etc. Hence a very strong index of pollution hazardness can be predicted.