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A study on Concentration PM10 and PM2.5 at Kancheepuram, West Tambaram Zone

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ABSTRACT

Air pollution is amixture of complex particles of solid and gases phase inthe air we breathe.Various types of emissions from chemicals and fumes from factories, motor vehicles, dust, pollen and mold from spores may be suspended in air as particles.[1]There are a lot of dust particles present in the atmosphere, among them hazardous substances are also present. The particle size is a direct relation to their capacitytocreate negative health impact.[2]Exposure to Air pollution poses complex problems, which are, heart or lung disease which lead to premature death in people, nonfatal heart attacks, fluctuation in heartbeat, asthma, decrease in lung function, with numerous respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.[3]Particulate matterof size less than 10 µm in aerodynamic diameter pose a higher risk, because they are susceptible to enter into your lungs, and some may enter your bloodstream.[3] Our study is only about the particle size PM2.5& PM10. We conducted this study at selectively five locations which were getting polluted day by day. Among them twolocationwere highly polluted. Station 1 & Station 3 had a PM10 concentration of 60.83µg/m3 and 86.32 µg/m3. In terms of PM2.5, Station 1 & Station 3 had the maximum concentration of 70 µg/m3 and 83 µg/m3 but was within the guideline limits as per CPCB.

1. INTRODUCTION

Besides air pollutants in gaseous phase, solid phase particles in the atmosphere can cause air pollution.[1] These particles have a nearly complex composition and size, and are sometimes known as aerosols.[4] They are 'particulate matter' many of which are found to be hazardous.[4] This includes both inorganic and organic particles, such as pollen, dust,liquid droplets, soot, and smoke.[5]Particles in the range 10 to 2.5 µm in aerodynamic diameter are called $PM_{2.5}$ and PM_{10} includes respirable particles that are small enough to enter the thoracic region of the respiratory system.[6]Particles of size less than 10 or 2.5 µmin aerodynamic diameter make up a large percentage of dust that can be inhaled deep into the lungs. Larger particles usually get trapped in the nasal opening, mouth or throat.[7]

The image below is an electron microscopic image of filter in which the particulate matter are trapped which was placed near a road. The little grey balls which are black carbon is omnipresent on this filter. Incomplete combustion particles are shown as blue balls; while the minerals are pink particles and the salts are green cubes.[8]

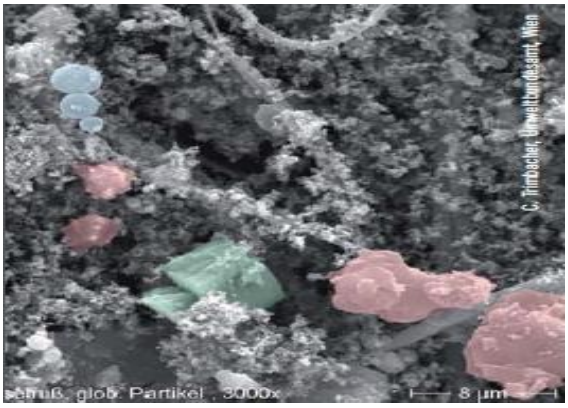

Figure 1: SEM Image of the Filter paper.

STUDY AREA ANDMETHODOLOGY

Study Area

Table .1 Location of Station

SITE	LATITUDE	LONGITUDE
Station 1(S1)	12º56’21.5”N	80º5’19.3”E
Station 2(S2)	12º93’72.1”N	80º8’55.5”E
Station 3(S3)	12º56’33.3”N	80º4’34.4”E
Station 4(S4)	12º94’37.2”N	80º6’98.9”E
Station 5(S4)	12º94’98.8”N	80º6’63.7”E

Fig. 2 Sampling Locations

2. Methodology

The sampler is transported to the field site carefully.The air sample is sucked in by vacuum pumpthrough inlet pipe, the orifice plate installed between filter and vacuum pump is used to measure the flow rate.[9]Particle larger than $10\mu m$ is removed in the inlet by using their inertia to trap them,while the finer particle passes through the instrument on to the preweighted filter.[10]The particulate matter concentration can be calculated using the relation between the mass of filter before and after exposure.[9]

Fig 3 : Air Sampler

The study was done during the Pre-Monsoon period during February 2020. The Average Time for each Sample is 24 Hours. The filter is removed from the Sampler and is weighed to calculate the Particulate Matter Concentration.

3. RESULTS AND DISCUSSION

Concentration of PM_{10}

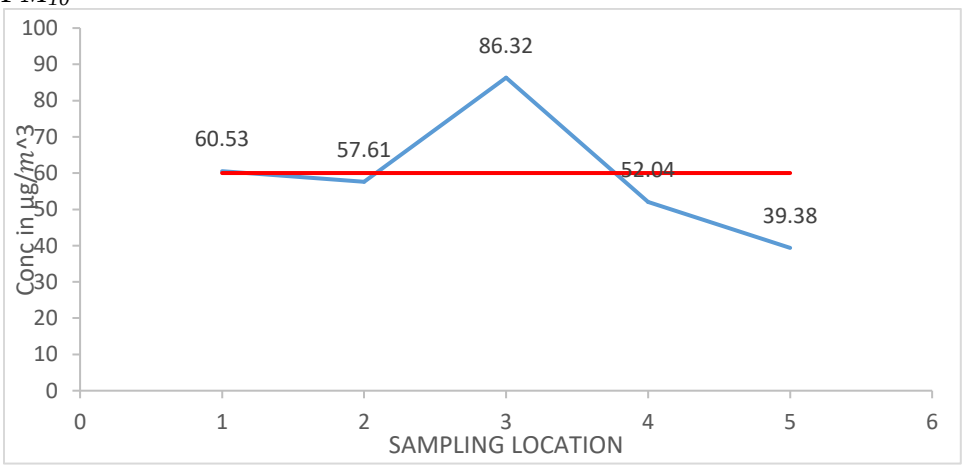

Fig 4. PM_{10} Concentration

The CPCB norms for PM_{10} is 60 µg/m^{3}as shown in figure 4. In this analysis the location S3 PM_{10} concentration of 86.52 µg/m^3 is under serious risk and location S1 has PM_{10} concentration of 60.53 µg/m^3 which is also above CPCB norms

Concentration of $PM_{2.5}$

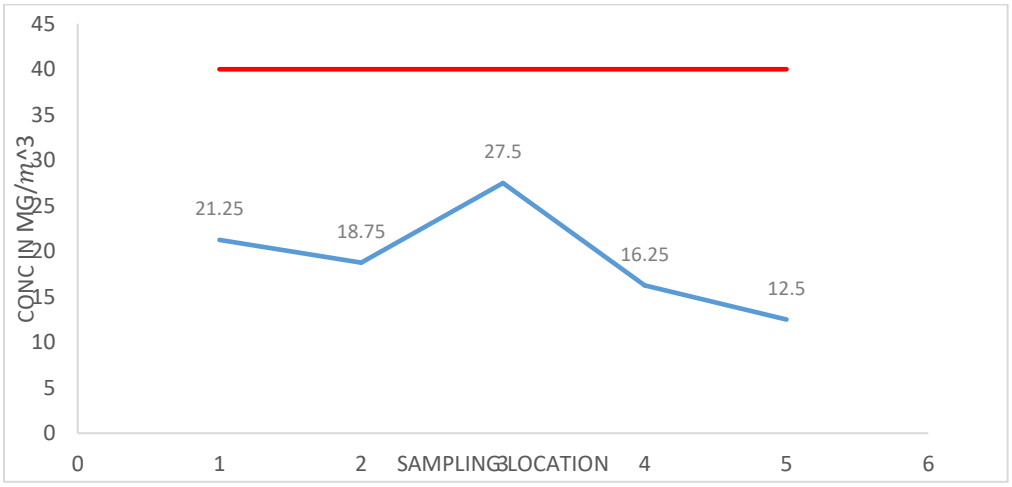

Fig 5. $PM_{2.5}$ Concentration

The CPCB norm for $PM_{2.5}$ is 40 µg/m^3 as shown in figure 5. All the five sampling locations have $PM_{2.5}$ concentration less than 40 µg/m^3.

CONCLUSION

- The source of Air Pollution was identified to be extensive quarrying in the locality and the heavy vehicles involved in transporting it.

- S1(12º56’21.5” N 80º5’19.3” E) is in the threshold limit and may be a threat to sensitive people residing in the locality.

- S3(12º56’33.3” N 80º4’34.4” E) is the area of concern, the PM_{10} concentration in that area is hazardous and steps to bring down the air pollution is the need of the hour.The particulate matter of PM2.5 is within the CPCB standard limit. So there is no risk of any Cardio attack and other major problems.
- The region, which was experimented, was not under very serious risk. The people living in this circumstance will not suffer from any serious issue like birth defects, cardio vascular inflammation, cardiovascular disease, premature delivery by PM2.5.
- But there is a slight risk by PM10 in two stations. The particulate matter present in these areas is greater than CPCB standards. Hence the stations (S1, S3) will have risk in it.

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