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Ambient Air Quality Monitoring at GIDC-Pandesara in Winter Season

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ABSTRACT

Ever increasing urban population and higher volume of automobile traffic in cities have resulted in severe air pollution. Although the ambient air quality monitoring network established by CPCB is expanding continuously, many areas and industrial zones in India lack monitoring stations. The present research reports monitoring of $PM_{2.5}$, PM_{10}, SO_x and NO_x in ambient air for Winter season at GIDC-Pandesara, Surat. Detailed study of the results obtained from air quality monitoring for winter season and conclusion is presented.

Keywords: Ambient Air Quality Monitoring, GIDC-Pandesara, Winter Season

I. INTRODUCTION

Air pollution has become a foremost issue throughout the world. Ever increasing urban population and higher volume of automobile traffic in cities have resulted in severe air pollution. Air pollution has severe adverse effects on the surrounding environment and human health. The concentration of air pollutants depends on two criteria: the amount of emission from sources as well as capability of the atmosphere to absorb these emitted amounts. The pattern of air pollution is different at different locations and time due to difference in meteorological and topographical conditions.

Ambient air quality monitoring programmes are essential for determining the present quality of air which leads to the conclusion whether control programme is efficient or not. It also helps to develop new more efficient quality control programme. Current air quality scenario in major Indian cities reveals the need for establishment of comprehensive action plans for improvement in the air quality. These Action plans must be pragmatic, technically feasible & economic so that the desired benefits can be achieved.

In India, ambient air quality monitoring is done by Central Pollution Control Board (CPCB), Various State Pollution Control Boards (SPCBs), and National Environmental Engineering Research Institute (NEERI). CPCB has launched National Air Quality Monitoring Programme (NAMP), under which 683 air quality monitoring stations are established [1].

Although the ambient air quality monitoring network is expanding continuously, many areas and industrial zones in India lack monitoring stations. CPCB publishes air pollutant status and trends at frequent intervals [2-7].

Number of studies by different researchers have been published reporting ambient air quality at different cities/towns/villages viz., Chennai [8], Jabalpur [9], Hyderabad [10], Haridwar [11], Delhi [12-19],

Coimbatore [20], Kalpakkam [21], Jaipur (Odisha) [22], Tiruchirapalli [23] etc.

The present study deals with the Air Quality Monitoring (AQM) in the winter season at the GIDC-Pandesara area in the Surat, Gujarat.

II. METHODS AND MATERIAL

Air quality was monitored in terms of concentration of four pollutants viz. $PM_{2.5}$, PM_{10}, SO_x and NO_x.

Site Description:

Location Name: GIDC Pandesara, District: Surat, State: Gujarat, Country: India.

Pandesara is an industrial area established located in the Surat district. The zone established by Gujarat Industrial Development Corporation in Pandesara (GIDC, Pandesara) was chosen as the location for air quality monitoring.

Before wind, Location specific and After wind air sampling was performed. Akash Dyeing & Printing Pvt Ltd. was chosen as site for location specific air sampling.

Standard methods used for monitoring various pollutants have been summerized in **Table-1**:

Table-1: Methods for Monitoring of Pollutants in Ambient Air

Sr. No.	Parameters	Analysis Methods
1	PM_{10}	IS-5182 [part-23] 2006
2	$PM_{2.5}$	IS-5182 [part-23] 2006
3	SO_X	IS-5182 [part-2] 2001/ West & Geake Method [50mL System]
4	NO_X	IS-5182 [part-6] 2006 Jacob-Hochheeiser Method [50 ml System]

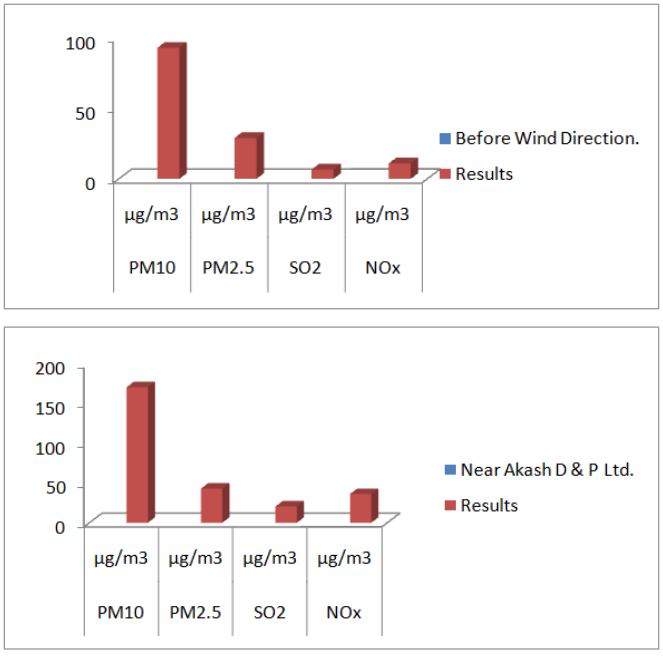
III. RESULTS AND DISCUSSION

The results of the study have been presented in **Table-2**. The concentrations of all four pollutants in ambient air in Winter season have been compared with the standard National Ambient Air Quality Standards (NAAQS) limits.

Table 2. Concentration of PM_{10}, $PM_{2.5}$, SO_x, NO_x in Ambient Air in Winter Season at GIDC-Pandesara:

	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_x (µg/m³)	NOx (µg/m³)
NAAQS	**60**	**40**	**50**	**40**
GIDC-Pandesara				
Before Wind Direction	93	29	6.64	11
Near Akash D & P Ltd.	170.53	43	20.59	36.16
After Wind Direction	219	87.5	37.19	44.02

Figure 1. Graphical Representation of Concentration of PM_{10}, $PM_{2.5}$, SO_x, NO_x in Ambient Air in Winter at GIDC- Pandesara:



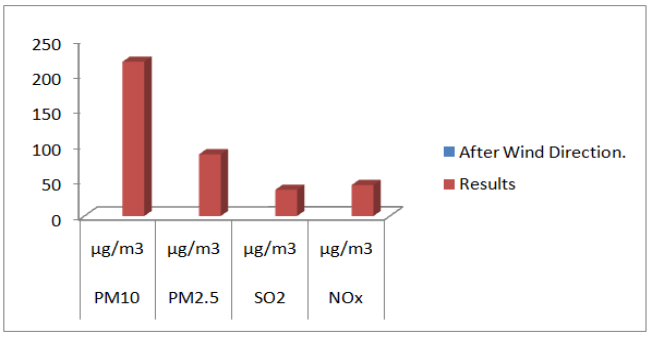
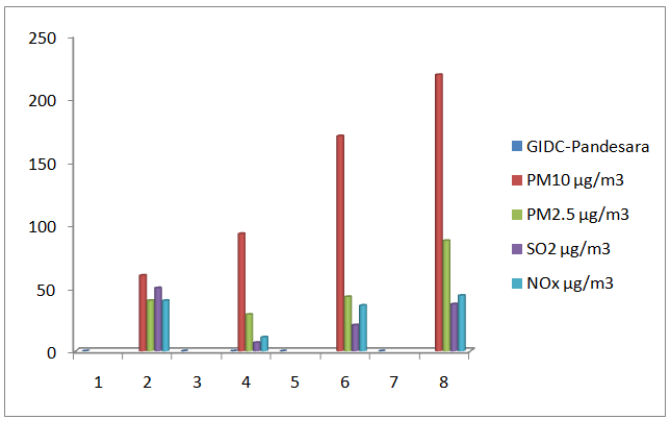


Figure 2. Comparison of Concentration of PM_{10}, $PM_{2.5}$, SO_x, NO_x in Ambient Air in Winter at GIDC-Pandesara with the NAAQS limits:



In the **Figure 2**; series 2, series 4, series 6 and series 8 on X-axis represent NAAQS, Before wind, Location specific (i.e., at Akash D&P) and After wind concentrations of four pollutants respectively. It was found that PM_{10} and $PM_{2.5}$ were in higher concentration than the NAAQS limit for the after wind measurements, while SO_x and NO_x were below the limit.

As seen from the results, concentration of ambient air pollutants is higher for the after wind direction. Thus, sampling from various types of industries located in various locations with wind direction (such as middle, left side of periphery and right side of periphery) was necessary to get the proper assessment.

IV. CONCLUSION

The study dealt with monitoring of the concentrations of $PM_{2.5}$, PM_{10}, SO_x and NO_x in ambient air for Winter season at GIDC-Pandesara, Surat. Comparison of results with the National Ambient Air Quality Standards (NAAQS) limits revealed that PM_{10} and $PM_{2.5}$ were found to be higher in concentration especially for after wind direction measurements than the NAAQS while SO_x and NO_x were found to be lower than the NAAQS limit.

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