



Determining the Concentration of Pollutant in Vizag Steel Plant

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ABSTRACT

The increase in the demand of steel has led to the increase in production of steel which results in the increase in the discharge of pollutant in the air. Which pollute the air causing harm to the comfort or health of humans and animals, or could damage plants and materials. This study process aims on monitoring the concentration of pollutants being expelled in the ambient air from the chimneys of vizag steel plant, which is situated in Visakhapatnam. The various air pollutants taken in consideration includes PM10, NOx and Sox. After analysis, the maximum concentration of PM10 is 135.88 µg/m³, NOx is 25.36 µg/m³, SOx is 17.69 µg/m³. The mean concentration of PM10 is 114.94 µg/m³, NOx is 17.06 µg/m³, SOx is 13.00 µg/m³.

Keywords: Ambient air, PM10, NOx, SOx

I. INTRODUCTION

Rapid industrialization & urbanization has resulted in the emergence of industrial centers that result in increase in pollution level of the air. In India, pollution has become a great topic of debate at all levels and especially the air pollution because of the enhanced anthropogenic activities. Among the harmful chemical compounds, of fossils fuels burning puts into the atmosphere, are carbon dioxide (CO₂), Carbon monoxide (CO), oxides of nitrogen (NO_x), oxides of sulphur (SO_x) and tiny solid particles – including lead from gasoline additive called particulate. Some substances come from natural sources while others are caused by human activities. In the modern world, due to increase in demand of

steel for various infrastructure development has led to the increase in much more production of steel as a result there is an increase in gaseous pollutant in air.

II. MATERIALS AND METHODS

The study was carried out in vizag steel plant which is located the southern part of the Visakhapatnam city (Latitude 17.6346° N and Longitude 83.1971° E), Andhra Pradesh state of India, Visakhapatnam (also known as Vizag and Waltair) is the largest city and the financial capital of the Andhra Pradesh. The city is the head quarter of the Eastern Naval command of the Indian Navy. Its geographical location is amidst the Eastern Ghats and the coast of the Bay of Bengal. Is the most populous city in the state with a population of 2 million as of 2011, making it the 14th largest city in the country, it is the 9th most populous metropolitan area in India. The city is the hub of industries and the commercial hub of the state. The city has many large industries such as The Hindustan petroleum refinery, Bharat heavy Plates and Vessels ltd., Coromandal Fertilizers, Hindustan zinc, Hindustan Shipyard etc. And many more small industries.

The sampling site was located within the steel plant. The sampling was carried out for 2 days in a week. The continuous sampling was carried for 8 hours a day, using High Volume Air Sampler of model no HVAIR100, and the analysis was carried out using spectrophotometer. The determination of NO_x was done by Modified Jacob Hochheiser method and the determination of SO_x was carried by Modified West and Gaeke method.

III. RESULTS AND DISCUSSION

The meteorological parameter determined for the study area is as shown in the Table 1.

S. No	Parameter(s)	Min	Mean	Max
1	Solar radiation (W/m ²)	1	914.8	123.9
2	Wind Speed (m/s)	Calm	8.7	1.6
3	Temperature(°C)	14.7	43.7	28.2
4	Relative Humidity (%)	7.9	98.8	68.2
5	Total Rainfall(mm)	1266.7		
6	Predominant Wind direction	WEST		

Table 1: The meteorological parameter of site

The predominant wind direction is towards west, with a total rainfall of 1266.7mm. The maximum temperature of the study area was 43.7°C while the minimum temperature was about 14.7°C. 98.8 % was the maximum humidity found in study area while minimum was 7.9% thus having the mean of 68.2%.

The variation in concentration particulate matter (PM10), oxides of nitrogen and the oxides of sulphur is shown in fig .1. fig.2, fig.3 respectively.

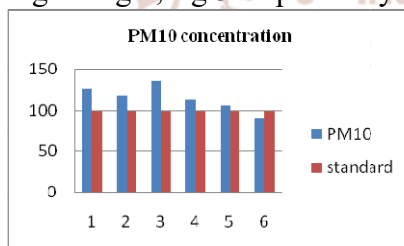


Fig1.2: PM10 concentration

The concentration of PM10 in almost on all days of sampling were exceeding the standard limit (100µg/m³) prescribed by the National Ambient Air Quality Standards. Except on last sampling date, where the concentration was about 91.25µg/m³. The maximum concentration is found 135.88 µg/m³ on third sampling date and the minimum concentration is found 91.25µg/m³ on the sixrh sampling date. The average concentration of PM10 was found to be 114.94µg/m³ which is above the standard limit.

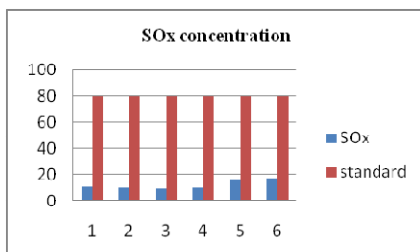


Fig1.3: variation in SOx concentration

The concentration of SOx in almost on all sampling days were below the standard limit (80µg/m³) prescribed by the National Ambient Air Quality Standards. The maximum concentration is found 17.69 µg/m³ on third sampling date and the minimum concentration is found 10.19µg/m³ on the sixrh sampling date. The average concentration of PM10 was found to be 13.00µg/m³ which is much below the standard limit.

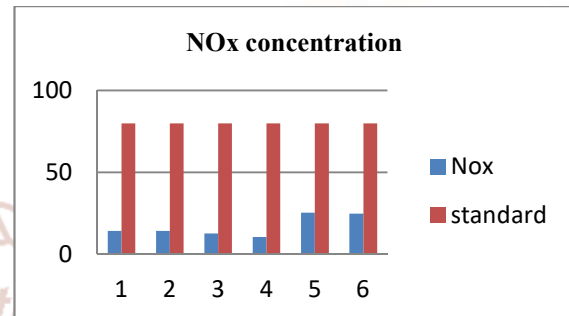


Fig 1.4 variation in NOx concentration

The concentration of NOx in almost on all sampling days were below the standard limit (80µg/m³) prescribed by the National Ambient Air Quality Standards. The maximum concentration is found 25.36 µg/m³ on third sampling date and the minimum concentration is found 10.65µg/m³ on the sixrh sampling date. The average concentration of PM10 was found to be 17.06µg/m³ which is much below the standard limit.

IV. CONCLUSIONS

Following are the conclusions drawn from the following studies

1. The Maximum PM10 Concentration is found to be 135.88µg/m³ and the minimum is 91.25µg/m³, the mean concentration is 114.94µg/m³. Which are more than the standard.
2. The NOx and SOx concentration is found to be very much less than standards prescribed by NAAQS.

REFERENCES

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