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Monitoring of Suspended Particulate Matter, SO₂, NO₂ and Air Quality Index from UBDT College of Engineering to Doddabudhihal in the Month of April

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ABSTRACT: The primary goal of this project is to investigate ambient air quality parameters such as suspended particulate matter (SPM), sulphur dioxide (SO₂), and nitrogen dioxide (NO₂) in Davanagere city from UBDT College of Engineering to Doddabudhihal, as well as to determine the Air Quality Index (AQI) in the Commercial, Industrial, Residential, and Sensitive areas of the 7 selected Davanagere locations during summer season in the month of April. The Railway Station has a higher concentration of suspended particulate matter, which exceeds the standard level of the National Ambient Air Quality Standards (NAAQS), whereas the other stations are under the acceptable limit. All of the stations have Sulphur Dioxide and Nitrogen Dioxide concentrations that are within the National Ambient Air Quality Standards (NAAQS). The Railway Station's Air Quality Index (AQI) score is extremely polluted, posing a serious threat to human health and causing a variety of issues.

KEYWORDS: Air Quality, Suspended Particulate Matter, SO₂, NO₂, NAAQS, AQI.

I. INTRODUCTION

Air pollution is a serious problem that affects people all around the world. Air pollution is defined as the presence of affluences in the environment that are harmful to social beings and other incarnate species, as well as their health and destruction. Gases and biological substances are only a few examples of air pollutants. Air pollution is caused by both artificial and natural factors. On our planet, no living species can survive without air. In three days, a man can survive without food. He, on the other hand, cannot survive without air. In general, a man requires 16.5 kilogrammes of air each day.

Pollutants in the air will enter the environment through a variety of sources, including natural and human sources, and will have an impact on the ecosystem. The combustion of fuel, the operation of motors, and industrial activities all emit pollutants into the atmosphere.

II. RELATED WORK

The 1984 Bhopal Disaster in India was the world's worst short-term civilian pollution crisis. At least 3787 people were murdered and 150,000 to 600,000 were injured when industrial gases from the Union Carbide factory, owned by Union Carbide, Inc. in the United States, leaked. When the Great Smog of 1952 formed over London on December 4th, the United Kingdom experienced its worst air pollution event. More than 4,000 people perished in six days, with more recent estimates putting the amount closer to 12,000 people. In India, air pollution is a major health concern. In 2019, India had 21 of the world's 30 most polluted cities. According to a study based on 2016 statistics, at least 140 million people in India breathe air that is 10 times or more polluted than the WHO acceptable limit, and India is home to 13 of the world's 20 cities with the highest annual air pollution levels. Industrial pollution accounts for 51% of pollution, whereas automobiles account for 27%, crop burning accounts for 17%, and fireworks account for 5%.



Every year, 2 million Indians die prematurely as a result of air pollution. Emissions come from automobiles and industry, but biomass burning for cooking and heating is a major source of pollution in rural regions. Large-scale crop residue burning in agriculture fields – a cheaper alternative to mechanical tilling – is a major source of smoke, haze, and particulate pollution in the autumn and spring months.

III. METHODOLOGY

The High Volume Air Sampler is the instrument that is used to test air quality features (HSAV). A device called as a large volume air sampler is used to gather TSP samples. The sample filter catches Total Suspended particles as air travels through the instrument, as shown in the illustration. After sampling, the filter is re-weighted, and the difference in filter weight equals the amount of particulate matter collected. TSP concentration is determined by multiplying the quantity by the capacity of the air sampled. The high volume air sampler collects suspended particles on large filter paper. The term "high volume" is appropriate since the sample flow rate is high, ranging from 1.1 to 1.7m³/min. Due to the high flow rate, large amounts of particles ranging from 0.1 to 1 gramme are collected during the course of a typical 24-hour sampler session. In terms of gravimetric and chemical analysis, high volume samplers have an advantage over conventional air sampling systems.

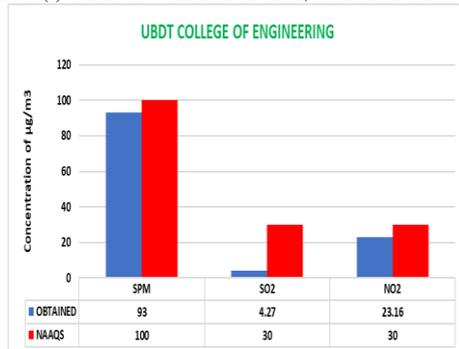
IV. EXPERIMENTAL RESULTS

During the warm season, from April, air pollution levels at each station can be graded based on the AQI results. The AQI test for the UBDT college in April indicated that the air was mildly polluted. At April, there was light air pollution in Vidyarthibhavan, Jayadeva circle, Honda circle, and Ramanagar, which is bearable. The air near the train station is very polluted during the months of April. Finally, in April, the AQI tests show that Doddabudhihal has clean air.

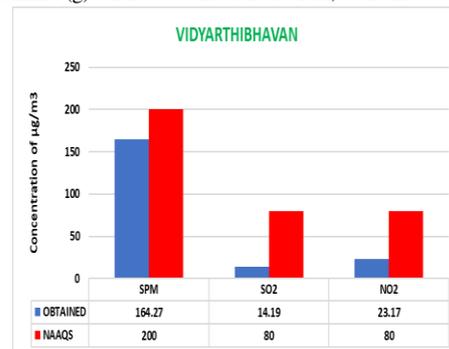
Table shows that the results of Suspended Particulate Matter, SO₂, NO₂, and air quality parameters from UBDT College of Engineering from Doddabudhihal in the month of April.

| Sl.no | Locations | Suspended Particulate Matter in µg/m ³ | SO ₂ in µg/m ³ | NO ₂ in µg/m ³ | AQI values during summer season in the month of april |
|-------|-----------------|---|--------------------------------------|--------------------------------------|---|
| 1 | UBDTCE | 93.00 | 4.27 | 23.16 | 61.47 |
| 2 | Vidyarthibhavan | 164.27 | 14.19 | 23.17 | 42.95 |
| 3 | Jayadeva circle | 186.32 | 21.42 | 21.32 | 48.86 |
| 4 | Railway station | 545.51 | 23.25 | 58.15 | 124.83 |
| 5 | Honda circle | 156.08 | 15.30 | 22.51 | 41.77 |
| 6 | Doddabudhihal | 84.99 | 8.42 | 14.49 | 23.71 |
| 7 | Ramanagar | 87.12 | 39.25 | 35.43 | 26.55 |

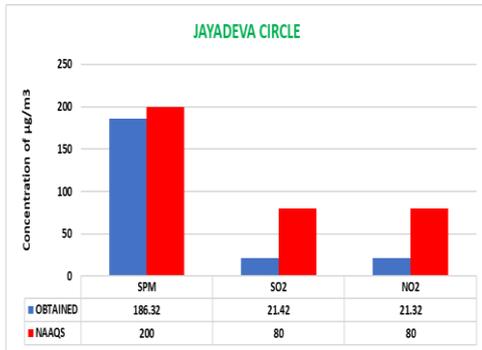
(a) Chart -1: Variation of SPM, SO₂ and NO₂ at UBDTCE (b) Chart -2: Variation of SPM, SO₂ and NO₂ at Vidyarthibhavan (c) Chart -3: Variation of SPM, SO₂ and NO₂ at Jayadeva Circle (d) Chart -4: Variation of SPM, SO₂ and NO₂ at Railway Station (e) Chart -5: Variation of SPM, SO₂ and NO₂ at Honda Circle (f) Chart -6: Variation of SPM, SO₂ and NO₂ at Doddabudhihal (g) Chart -7: Variation of SPM, SO₂ and NO₂ at Ramanagar



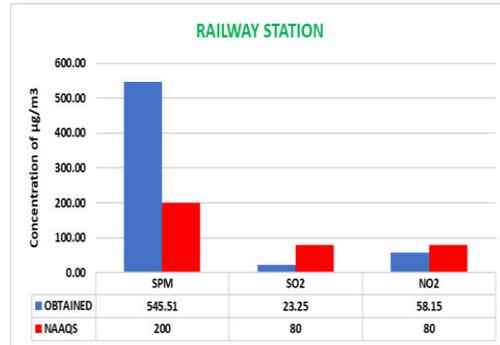
(a)



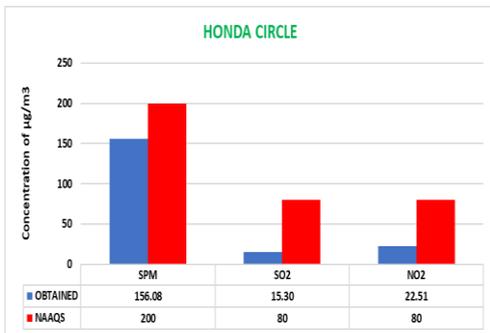
(b)



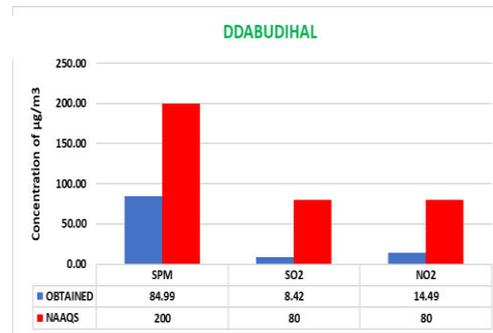
(c)



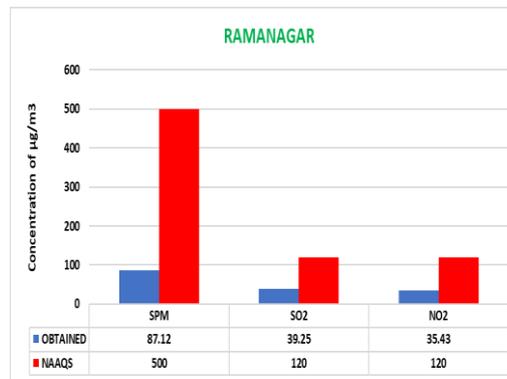
(d)



(e)



(f)



(g)

V. CONCLUSION

Based on the location, it is reasonable to assume that the SPM concentration is greater in the Railway station in April and exceeds the NAAQS (National Ambient Air Quality Standards) standard limit, while the rest areas are within the standard limit. In all sites, SO₂ and NO₂ concentrations were within the NAAQS permissible levels throughout the month of April. The AQI of the railway station was quite high, making it exceedingly harmful for the population and producing a range of health issues.



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