ADDITIONAL PRACTICAL EXPERIMENT NO: 8

To calculate *Air Quality Index (AQI)* of Dwarka and Nearby Area

Conducted By: Dr. Pramod Kumar

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REPORT

Department of Botany conducted additional experiment no. 8 - "To Calculate Air Quality Index (AQI) of Dwarka and Nearby Area", under the aegis of DBT Star College Scheme on 31st January, 2019 at ICT Centre.

Theme of the Experiment

Awareness of daily levels of air pollution is important to the citizens, especially for those who suffer from illnesses caused by exposure to air pollution. Further, success of a nation to improve air quality depends on the support of its citizens who are well-informed about local and national air pollution problems and about the progress of mitigation efforts. Thus, a simple yet effective communication of air quality is important. MoEFCC launched the National Air Quality Index (AQI). AQI, as 'One number-One Colour-One Description' for the common man to judge the air quality within his vicinity. The formulation of the index was a continuation of the initiatives under Swachh Bharat Mission. The concept of an air quality index (AQI) that transforms weighted values of individual air pollution related parameters (e.g. SO_2, CO, visibility, etc.) into a single number or set of numbers is widely used for air quality communication and decision making in many countries. An Air Quality Index (AQI) is a number used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become.

- *Indicates whether pollutant levels in air may cause health concerns.*
- *Ranges from 0 (least concern) to 500 (greatest concern)*

As the value of AQI increases, an increasingly large percentage of the population is likely to experience increasingly severe health effects. The daily results of the index are used to convey to the public an estimate of air pollution level. In most cases, AQI indicates how clear or polluted the air in our surrounding is, and the associated health risks it might present. The AQI centers on the health effects that may be experienced within a few days or hours after breathing polluted air. Briefly, an AQI is useful for:

a) General public to know air quality in a simplified way,
b) A scientist who engages in scientific research using air quality data.
c) A politician to invoke quick actions,
d) A decision maker to know the trend of events and to chalk out corrective pollution control strategies,
e) A government official to study the impact of regulatory actions, and enforcement of Standards.

Experiment

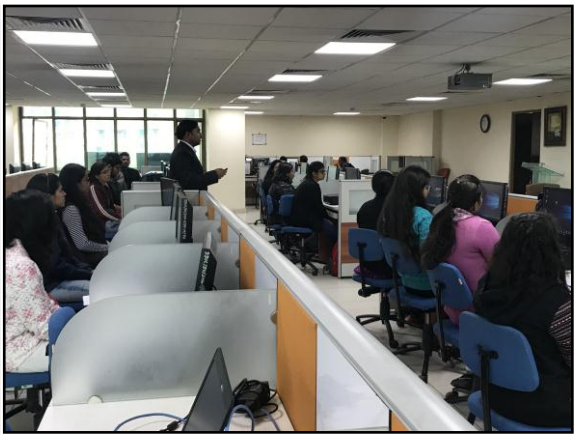
The Hands-on experiment was attended by 23 students of B.Sc. (H) Botany, Semester - II. The experiment was planned in such a manner to incorporate MS-Excel learning for developing software so that the gap between the theoretical concepts and the practical aspects could be bridged. Students were provided with a manual of "Stepwise guide to experiment" in which they recorded all the observations. The main key points of the lecture were:-

- Brief description about Air Quality
- Basic Introduction and principle of Air Quality Index (AQI)
- Major pollutants of interest for the purpose of calculation

- The concept of calculation of AQI with comments on the health status of people.
- Propagation of scientific thoughts.

The presentation began with the basic introduction of air quality and then methodology for calculating AQI was explained to the students. In order to have clear implications of the calculations the students were also taught the ways to comments upon the health status. The presentation was followed by an interactive session between the students and the teacher wherein the air quality of various states was discussed in detail. The presentation was concluded with a demonstration of the AQI program made on MS-Excel for calculating AQI for various concentrations of Air pollutants. After the presentation, the procedure to download online data of various pollutants from Continuous Emission Monitoring Systems was also explained. The students enthusiastically participated and downloaded the concentrations of pollutants and then calculated the AQI of different areas. They also calculated the AQI of their hometowns and some found the air quality status of the decade as well.

The experiment gave an opportunity to the students to critically analyze the status of air quality and provide the information to the local people who are not aware of the conditions of the deteriorating air, but most importantly, the students were given the opportunity to learn MS-office and develop the software on their own followed by online data procurement. A total of five assignments were performed by the students. Students were able to get theoretical as well as practical knowledge with online procurement of data. Students learnt by using excel how to convert raw data into meaningful information. The students also shared their experience after the experiment and wished to participate in many more such experiments in future too. As commented by the students, the experiment was very well organized, informative and helped them to enhance their skills. The efforts of the teacher were also appreciated by the participants.



DEEN DAYAL UPADHYAYA COLLEGE

Sector-3, Dwarka, New Delhi-110078

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Date: 31.01.2019

WORKSHEET

Course Name: B.Sc. (H) Botany Sem. II	
Name of the Student:	**Roll No:**

Q. Calculate the Air Quality Index (AQI) and comment on the health status of the area.

1. 24 Hour $PM_{2.5}$ concentration value monitored at Dwarka site is 75 $\mu g\ m^{-3}$
2. 24 Hour PM_{10} concentration value monitored at Dwarka and nearby area is 135 $\mu g\ m^{-3}$
3. 8 Hour Ozone concentration value monitored at the busy traffic intersection site is 0.08753 ppm.
4. 24 Hour SO_2 concentration value monitored at Dwarka and nearby area is 0.05814 ppm.
5. 24 Hour NO_2 concentration value monitored at Traffic intersection site in Dwarka 1.1036 ppm.

Table: Breakpoints for the Air Quality Index (AQI)

These breakpoints						Equal these AQIs * * *		Category
O_3 (ppm) 8-hour	O_3 (ppm) 1-hour[1]	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	CO (ppm)	SO_2 (ppm)	NO_2 (ppm)	AQI	
0.000–0.064	.....	0.0–15.4	0–54	0.0–4.4	0.000–0.034	([2])	0–50	Good.
0.065–0.084	.....	15.5–40.4	55–154	4.5–9.4	0.035–0.144	([2])	51–100	Moderate.
0.085–0.104	0.125–0.164	40.5–65.4	155–254	9.5–12.4	0.145–0.224	([2])	101–150	Unhealthy for sensitive groups.
0.105–0.124	0.165–0.204	[4]65.5–150.4	255–354	12.5–15.4	0.225–0.304	([2])	151–200	Unhealthy.
0.125–0.374	0.205–0.404	[4]150.5–250.4	355–424	15.5–30.4	0.305–0.604	0.65–1.24	201–300	Very unhealthy.
([3])	0.405–0.504	[4]250.5–350.4	425–504	30.5–40.4	0.605–0.804	1.25–1.64	301–400	
([3])	0.505–0.604	[4]350.5–500.4	505–604	40.5–50.4	0.805–1.004	1.65–2.04	401–500	Hazardous.

[1]Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated, and the maximum of the two values reported.

[2]NO_2 has no short-term NAAQS and can generate an AQI only above an AQI value of 200.

[3]8-hour O_3 values do not define higher AQI values (≥ 301). AQI values of 301 or higher are calculated with 1-hour O_3 concentrations.

[4]If a different SHL for $PM_{2.5}$ is promulgated, these numbers will change accordingly.

Pramod Kumar
Experiment In-charge

Signature
Member, DBT

AIR QUALITY INDEX OF AN URBAN AREA

S.No.	Pollutant	I_{Hi}	I_{Lo}	BP_{Hi}	BP_{Lo}	C_p	$I_{Hi}-I_{Lo}$	$BP_{Hi}-BP_{Lo}$	C_p-BP_{Lo}	Air Quality Index	Final Value
										AQI	AQI
1	Ozone	150	101	0.104	0.085	0.08753	49	0.019	0.0025333	107.5332474	108
2	$PM_{2.5}$	200	151	150.4	65.5	75	49	84.9	9.5	156.4829211	156
3	PM_{10}	100	51	154	55	135	49	99	80	90.5959596	91
4	SO_2	100	51	0.144	0.035	0.05814	49	0.109	0.02314	61.40238532	61
5	NO_2	300	200	1.24	0.65	1.1036	100	0.59	0.4536	276.8813559	277

Where,

I_p= the (Air Quality) index for pollutant p

C_p = the rounded concentration pollutant p,

BP_{Hi} = the breakpoint that is greater than or equal to C_p

BP_{Lo} = the breakpoint that is less than or equal to C_p,

I_{Hi} = the AQI value corresponding to BP_{Hi},

I_{Lo} = the AQI value corresponding to BP_{Lo}.

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Experiment In-charge.

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Date: 31.01.2019

Course Name: B.Sc. (H) Botany Sem. II **Name of the Faculty: Dr. Pramod Kumar**

S.No.	Roll No.	Name of the Student	Signature
1.	18HBT6801	Aastha Verma	Aastha.
2.	18HBT6804	Aniket Kumar	Aniketkumar
3.	18HBT6805	Astha Purwar	Astha
4.	18HBT6806	Atul Kumar	Atul Kumar
5.	18HBT6807	Chandrika	Chandrika
6.	18HBT6808	Chandra Prakash	—
7.	18HBT6810	Dawa Namgial	Dawa
8.	18HBT6811	Devshree Singh	—
9.	18HBT6813	Juhi Srivastava	Juhi
10.	18HBT6814	Khushal Gautam	Khushgautam
11.	18HBT6815	Mamta Khanna	Mamta Khanna
12.	18HBT6817	Monika	Monika
13.	18HBT6819	Nikita Singh	Nikita
14.	18HBT6820	Priyanshi Sahu	Priyanshi Sahu
15.	18HBT6821	Radhika	Radhika
16.	18HBT6823	Ranjana	—
17.	18HBT6824	Ria Britney Masih	RBM
18.	18HBT6825	Rinki	Rinki
19.	18HBT6826	Saksham Jamwal	—
20.	18HBT6827	Sargam Bharti	—
21.	18HBT6829	Shrikant Tyagi	—
22.	18HBT6830	Sourabh Kumar	Sourabh
23.	18HBT6832	Suraj	Suraj
24.	18HBT6834	Vandana	Vandana
25.	18HBT6835	Vichitra	—
26.	18HBT6836	Vishal Arora	Vishal
27.	18HBT6837	Yogesh Kumar Meena	Yogesh
28.	18HBT6838	Ekta	Ekta
29.	18HBT6839	Tanu Priya	Tanupriya
30.	18HBT6840	Harsha S.	Harsha

Pramod Kumar
Experiment Incharge.

Signature
Member, DBT