What is the Air Quality Index?

• Index for **reporting air quality**

• **Color is key** for communication

• Ranges from **0 to 500** (no units)

• Provides indicator of the quality of the air and its health effects

• The AQI measures five criteria air pollutants :

- **Particulate Matter $PM_{2.5}$**
- Sulfur dioxide S_2O
- Carbon monoxide CO
- Nitrogen dioxide N_20
- Ozone O_3

AQI Value	AQI Category	AQI Color
0 - 50	Good	Green
51 - 100	Moderate	Yellow
101 - 150	Unhealthy for Sensitive Groups	Orange
151 - 200	Unhealthy	Red
201 - 300	Very Unhealthy	Purple
301 - 500	Hazardous	Maroon

Daily Air Quality Standard

AQI LEVEL	Health Descriptor	Meaning
0 - 50	GOOD	Quality is considered satisfactory and poses little or no risk to health
51 - 100	MODERATE	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution
101 - 150	UNHEALTHY FOR SENSITIVE GROUPS	Although the general public is not likely to be affected at this AQI range, people with lung disease, older adults and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, older adults and children are at greater risk from the presence of particles in the air
151 - 200	UNHEALTHY	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects
201 - 300	VERY UNHEALTHY	Health alert: everyone may experience more serious health effects
301 - 500	HAZARDOUS	Health warnings of emergency conditions; the entire population is more likely to be affected

$PM_{2.5}$ – AQI:

AQI Category	AQI Value	24-hr Average $PM_{2.5}$ Concentration (µg/m³)
Good	0 - 50	0 - 15.4
Moderate	51 - 100	15.5 - 40.4
USG	101 - 150	40.5 - 65.4
Unhealthy	151 - 200	65.5 - 150.4
Very Unhealthy	201 - 300	150.5 - 250.4
Hazardous	301 - 500	250.5 - 500.4

PM_{10} – AQI:

AQI Category	AQI Value	24-hr Average PM_{10} Concentration (µg/m³)
Good	0 - 50	0 – 54
Moderate	51 - 100	55 – 154
USG	101 - 150	155 – 254
Unhealthy	151 - 200	255 – 354
Very Unhealthy	201 - 300	355 – 424
Hazardous	301 - 500	425 – 604

Other Pollutants to AQI:

EPA's table of breakpoints is:[37][38][39]

O_3 (ppb)	O_3 (ppb)	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	CO (ppm)	SO_2 (ppb)	NO_2 (ppb)	AQI	AQI
C_{low} - C_{high} *(avg)*	C_{low} - C_{high} *(avg)*	C_{low}- C_{high} *(avg)*	C_{low} - C_{high} *(avg)*	C_{low} - C_{high} *(avg)*	C_{low} - C_{high} *(avg)*	C_{low} - C_{high} *(avg)*	I_{low} - I_{high}	**Category**
0-54 (8-hr)	-	0.0-12.0 (24-hr)	0-54 (24-hr)	0.0-4.4 (8-hr)	0-35 (1-hr)	0-53 (1-hr)	0-50	Good
55-70 (8-hr)	-	12.1-35.4 (24-hr)	55-154 (24-hr)	4.5-9.4 (8-hr)	36-75 (1-hr)	54-100 (1-hr)	51-100	Moderate
71-85 (8-hr)	125-164 (1-hr)	35.5-55.4 (24-hr)	155-254 (24-hr)	9.5-12.4 (8-hr)	76-185 (1-hr)	101-360 (1-hr)	101-150	Unhealthy for Sensitive Groups
86-105 (8-hr)	165-204 (1-hr)	55.5-150.4 (24-hr)	255-354 (24-hr)	12.5-15.4 (8-hr)	186-304 (1-hr)	361-649 (1-hr)	151-200	Unhealthy
106-200 (8-hr)	205-404 (1-hr)	150.5-250.4 (24-hr)	355-424 (24-hr)	15.5-30.4 (8-hr)	305-604 (24-hr)	650-1249 (1-hr)	201-300	Very Unhealthy
-	405-504 (1-hr)	250.5-350.4 (24-hr)	425-504 (24-hr)	30.5-40.4 (8-hr)	605-804 (24-hr)	1250-1649 (1-hr)	301-400	Hazardous
-	505-604 (1-hr)	350.5-500.4 (24-hr)	505-604 (24-hr)	40.5-50.4 (8-hr)	805-1004 (24-hr)	1650-2049 (1-hr)	401-500	

AQI Calculation:

$$AQI = \frac{AQI_{high} - AQI_{low}}{C_{high} - C_{low}} (C - C_{low}) + AQI_{low}$$

where,
C → Concentration of $PM_{2.5}$ [24 hrs]

if C = 31 for $PM_{2.5}$

$$= \frac{100 - 51}{35.4 - 12.1} (31 - 12.1) + 51$$

$$= \frac{49}{23.3} (18.9) + 51$$

$$= \frac{926.1}{23.33} + 51$$

$$= 90.74$$

AQI = 91 ∴ 51 < 91 < 100 → Moderate //