Group: VOC's

Asanya Angus
Nathany Boekhoudt
Justin Mohamed
Dorshon Salmon

.
This report will discuss VOC's as a pollutant to air quality. We will be discussing what VOC's are, how they impact air quality and also what we used to take the measurements found below.

VOC stands for Volatile Organic Compound. These organic compounds can easily become gasses or vapor. VOCs are a threat to our air quality. They contain elements such as carbon, , oxygen, chlorine, bromine, sulfur, fluorine, nitrogen or hydrogen. Some of the most dangerous and common of these industrial VOCs are benzene, toluene, formaldehyde, vinyl chloride, phenols, chloroform, and trichloroethylene. VOCs are often components of petroleum fuels, hydraulic fluids, paint thinners, and dry cleaning agents. This is why there is more VOCs indoors than outdoors because these compounds can be found in paint, cleaning supplies, glue, pesticides, printers etc. The VOCs indoors are 10 times higher than outdoors.

It's important to know if we're in an area where there is increase of VOCs. The air quality is filled with these compounds that we breathe in and it will affect us. The more toxic it is the less healthy it is and it can lead to e.g. irritation of nose, throat or nausea. We need to be aware where we use most of the products that contain the VOCs in order to decrease it and improve air quality.

Group: VOC’s

Measurements at UA:

VOC’s (ppm)	Time (s)
21	5
20	10
21	15
21	20
21	25
21	30
20	35
21	40
21	45
20	50

The Adafruit MiCS-5524 is a sensor for indoor carbon monoxide and natural gas leakage detection; it's suitable also for indoor air quality monitoring and is also used as breath checker detection. This sensor is sensitive to CO (~ 1 to 1000 ppm), Ammonia (~ 1 to 500 ppm),Ethanol (~ 10 to 500 ppm), H2 (~ 1 - 1000 ppm), and Methane / Propane / Iso-Butane (~1,000++ ppm). However, it cannot tell you which gas it has detected.

Using it is easy, Power it with 5 VDC and read the analog voltage off of the output pin. When gasses are detected, the analog voltage will increase in proportion of detected gas. When powered, the heater draws about 25-35mA. You can use the EN pin to power it off (pull it high to 5V to turn off) to conserve energy. Just make sure to wait a second after turning the heater on to make sure it’s all heated before taking readings. Each order comes with one assembled and tested MiCS-5524 breakout and a small amount of header. You'll need to do some light soldering to attach the header on - or you can use just plain wires.

Group: VOC's

Below will be the EPA's set standards for concentrations of particular VOC's as part of the Clean Air Act:

Pollutant **[links to historical tables of NAAQS reviews]**	**Primary/** **Secondary**	**Averaging Time**	**Level**	**Form**
Carbon Monoxide (CO)	primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)	primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years

Group: VOC's

		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years

Group: VOC's

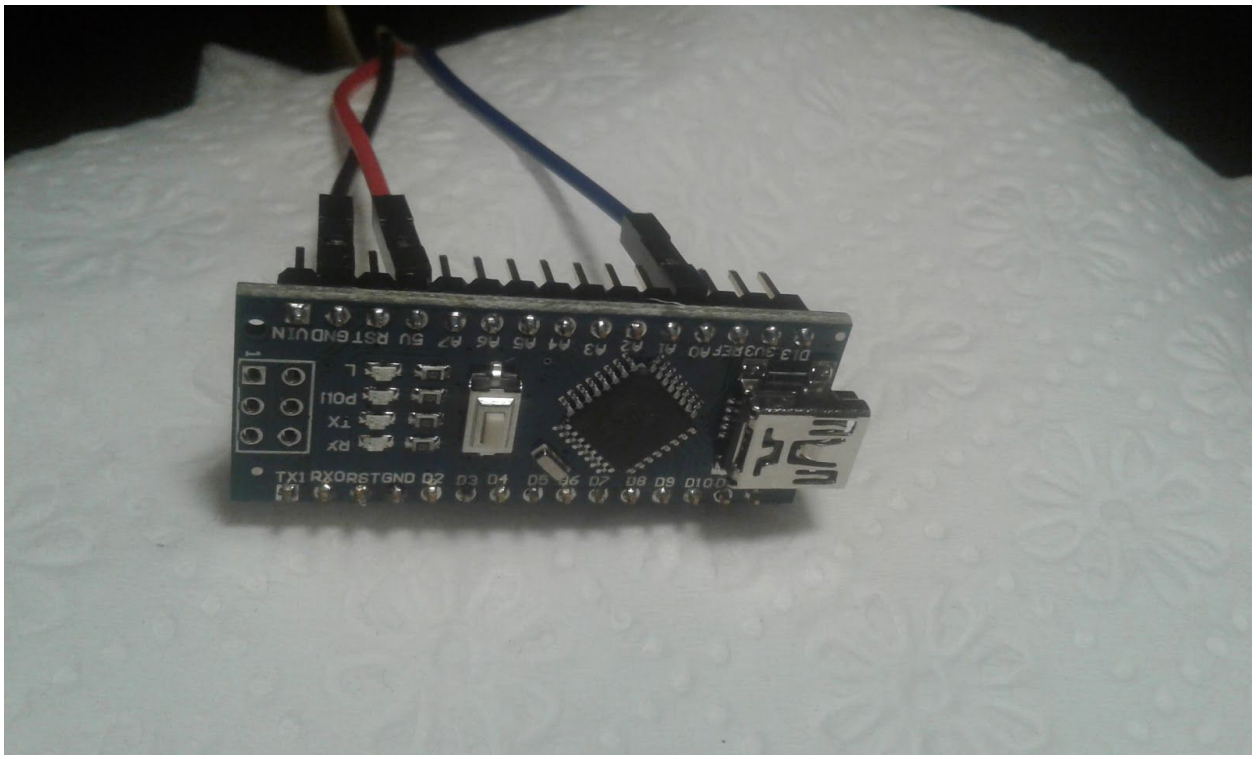
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

The code used:

```
#define LED 11

void setup() {
  Serial.begin(115200);
  Serial.println("MiCS-5524 demo!");

  pinMode(LED, OUTPUT);
```

```
}

void loop() {
  int reading = analogRead(A0);
  Serial.println(reading);

  analogWrite(LED, reading);
  delay(5000);
}
```

Our sensor and circuit used:



Group: VOC’s

Group: VOC’s

Group: VOC’s