

Can TVOC-sensors be used for ventilation control?



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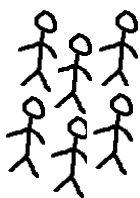
Demand controlled ventilation



Temperature,
Relative humidity,
CO₂

Comfort,
Mould risk

Air quality



- Day Care Centers
- Classrooms
- Meeting rooms
- Offices



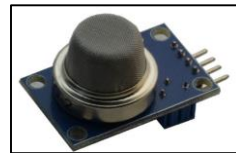
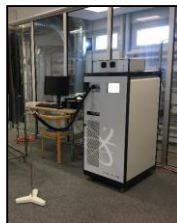
- Residential buildings

Other Activities
such as cleaning, painting, cooking
(VOC's)

Methods for measuring indoor air quality (VOC's)



Passive sampling	Active sampling	PTR-MS	VOC sensors
Sorbent material	Air flow through Sorbent sampling tube	Transportable chemical analysis equipment	Electronic and small built-in sensors
h/days to weeks \bar{X}	Min to h \bar{X}	Real time - online	Real time - online



TVOC/VOC sensors



Types; MOS, PID, FID (ionization detector)

Inexpensive MOS sensors (Metal Oxide Semiconductor), suitable for measuring VOC's.

Little documentation on how the sensors work

Little documentation on sensor performance

Selection of suitable sensors for indoor purposes:



Figarosensor.com

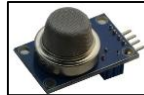
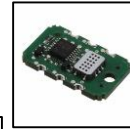
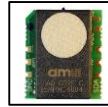
Producer	Model	Short name	Sensor/ integrated in a box	Price pr. Unit in €	No. of tested sensors	Output
SGX Sensortech	MICS-VZ-89TE	SGX	Sensor	18.5	2	TVOC (ppb)
AMS	iAQ-Core C	iAQ	Sensor	19.8	2	TVOC (ppb)
Omelix	MQ-135	MQ135	Sensor	5.5	5	Volt
Winsen	MQ503	MQ503	Sensor	2.4	2	Volt
Siemens	QPA1000	QPA1000	Box	148.5	1	Volt
S+S Regeltechnik	RLQ-W	RLQ	Box	163	1	Volt

Tested MOS sensors



- AMS, iAQ-core C
- SGX, MiCS-VZ-89TE
- Olimex, MQ-135
- Winsen, MQ503

- S+S Regeltechnik, RLQ-W
- Siemens, QPA1000
(Figaro, TGS2600)

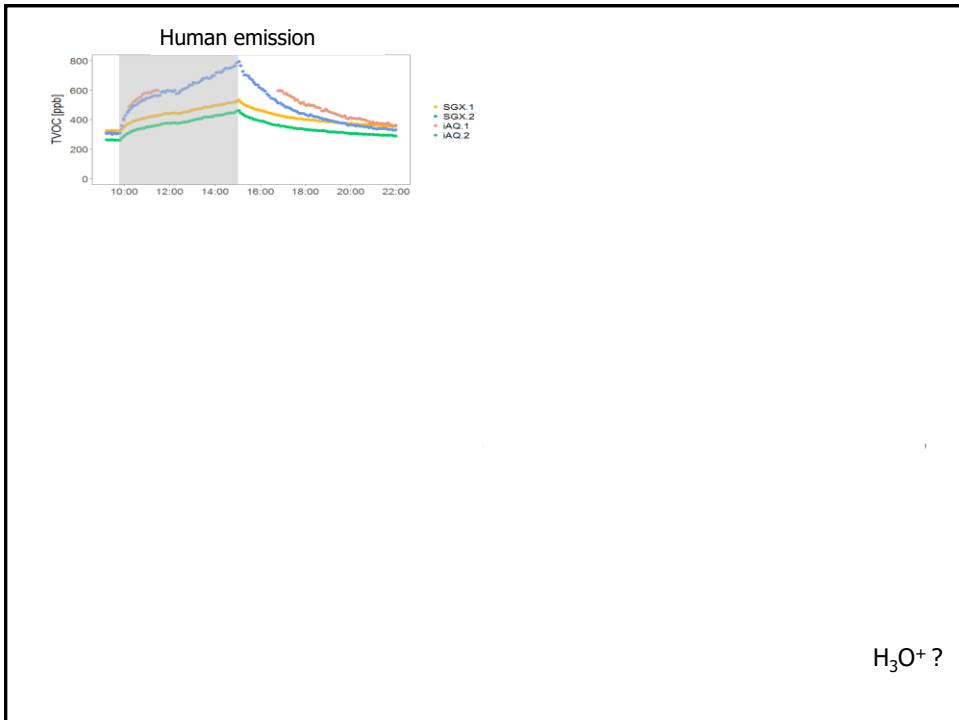


Method



- Full Scale Test Facility (EnergyFlexOffice) – Constant T, RH & ACH
- Activities;
Painting, Cooking, Cleaning, Candles burning, Human emissions, Humidity, Linoleum flooring, Ethanol, Background

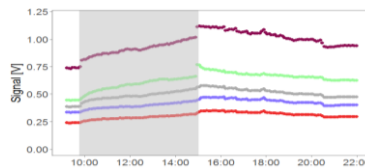




Conclusion



- They were good at detecting changes in the air quality (compared to PTR-MS)
- Differences between sensor models
 - Measuring interval
 - Sensitivity
 - Which VOC's
 - Response to changes in RH
 - Temperature ?
- Variations between sensors of the same model
- Limited documentation from manufacturers & suppliers
 - need for testing
- Requirements for controlling ventilation, e.g. normalization of the signal
- Interpretation of signal e.g. Volt/TVOC (ppb)
- What happens over time?
- Can TVOC sensors be used for ventilation control?
 - Not *Plug & Play*, but possible.



The preformed tests was part of two different projects



TVOC-sensors use in evaluating air quality



RoomVent Solutions



Test is performed by:



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