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CIRCULAR PLASTICS NETWORK FOR TRAINING

FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG
FACULTY OF SCIENCES

ESR 8 – Odour characterization, monitoring, control and removal from recycled plastics

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Introduction:

- Europe moving towards a circular economy

- More than 15 millions tons of plastic processed in Germany alone in 2018

- Low-grade outdoor applications in the agriculture and construction sector shows the highest application amount of recycled plastics

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Introduction:

-> Demand for high-quality recyclates in new products

-> Recycling processes often cannot produce the recycled quality required by the packaging industry (free of odors/contamination)

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Recycled plastic must be enhanced in quality to fit a closed-loop process!

ESR 8 – Objectives:

-> Characterize the causative odor-active constituents in recycled plastics (identification, formation pathways) by use of adequate analytical methods (gas chromatographic methods, olfactometry)

-> Test new ways of reducing the odor load in recycled plastics with a focus on washing processes

-> Test and optimize sensor technologies for on-line processes

How does a GC-O work?

Basic scheme of a GC:

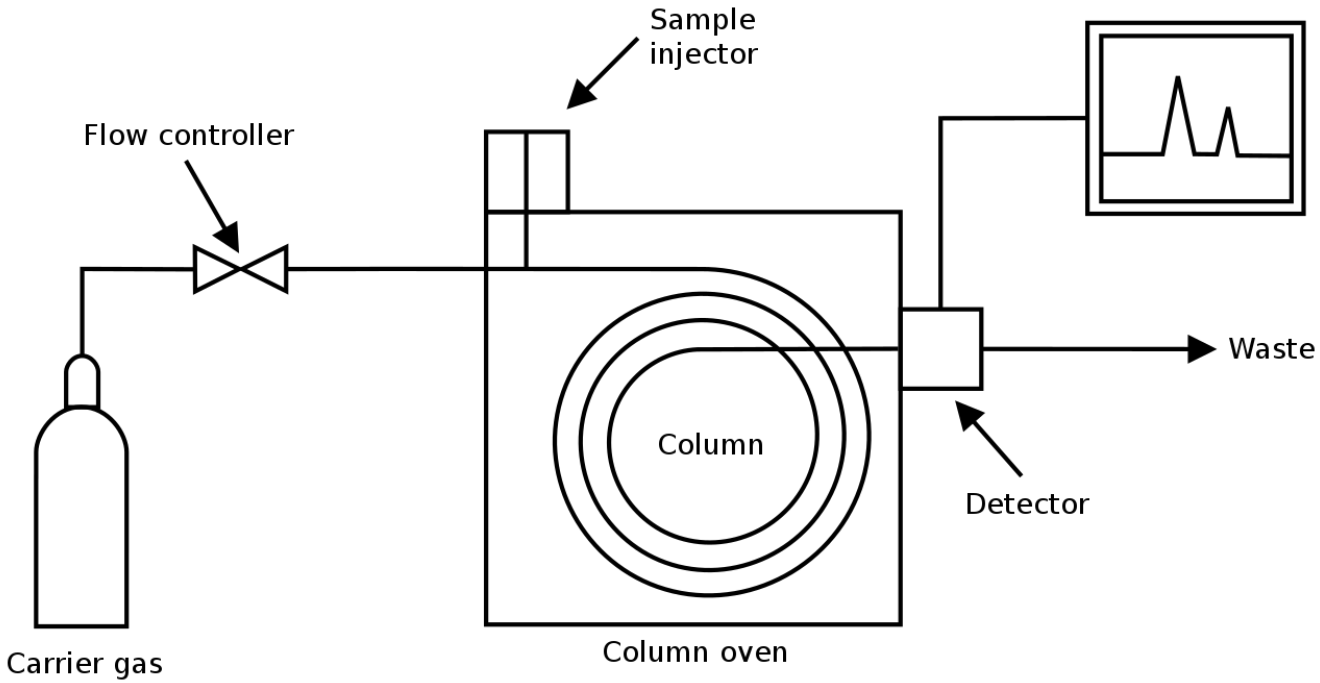

Image origin:https://commons.wikimedia.org/wiki/File:SchemaGC.png
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Inside a GC column:

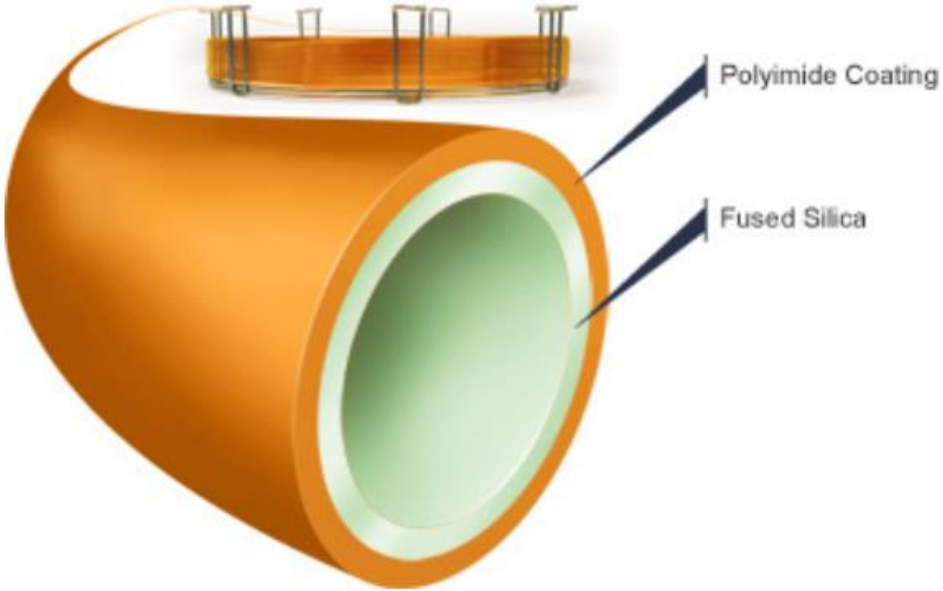
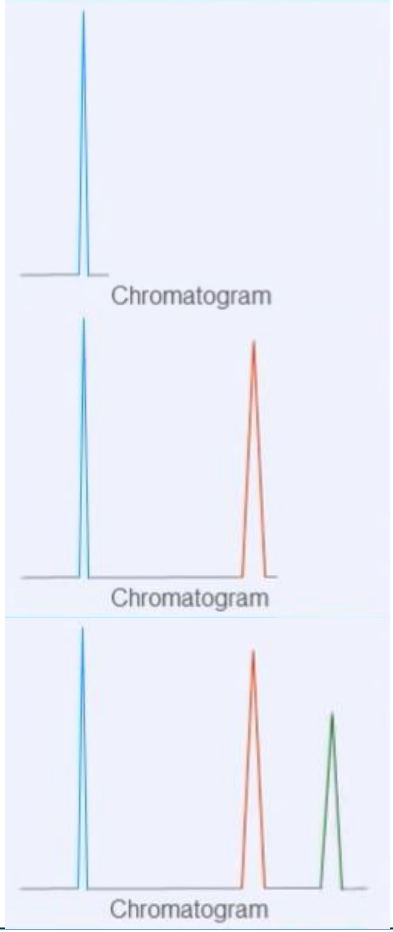


Image origin:
https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Instrumental_Analysis/Chromatography/Gas_Chromatography

What happens inside it:

To detector



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How does a GC-O work?

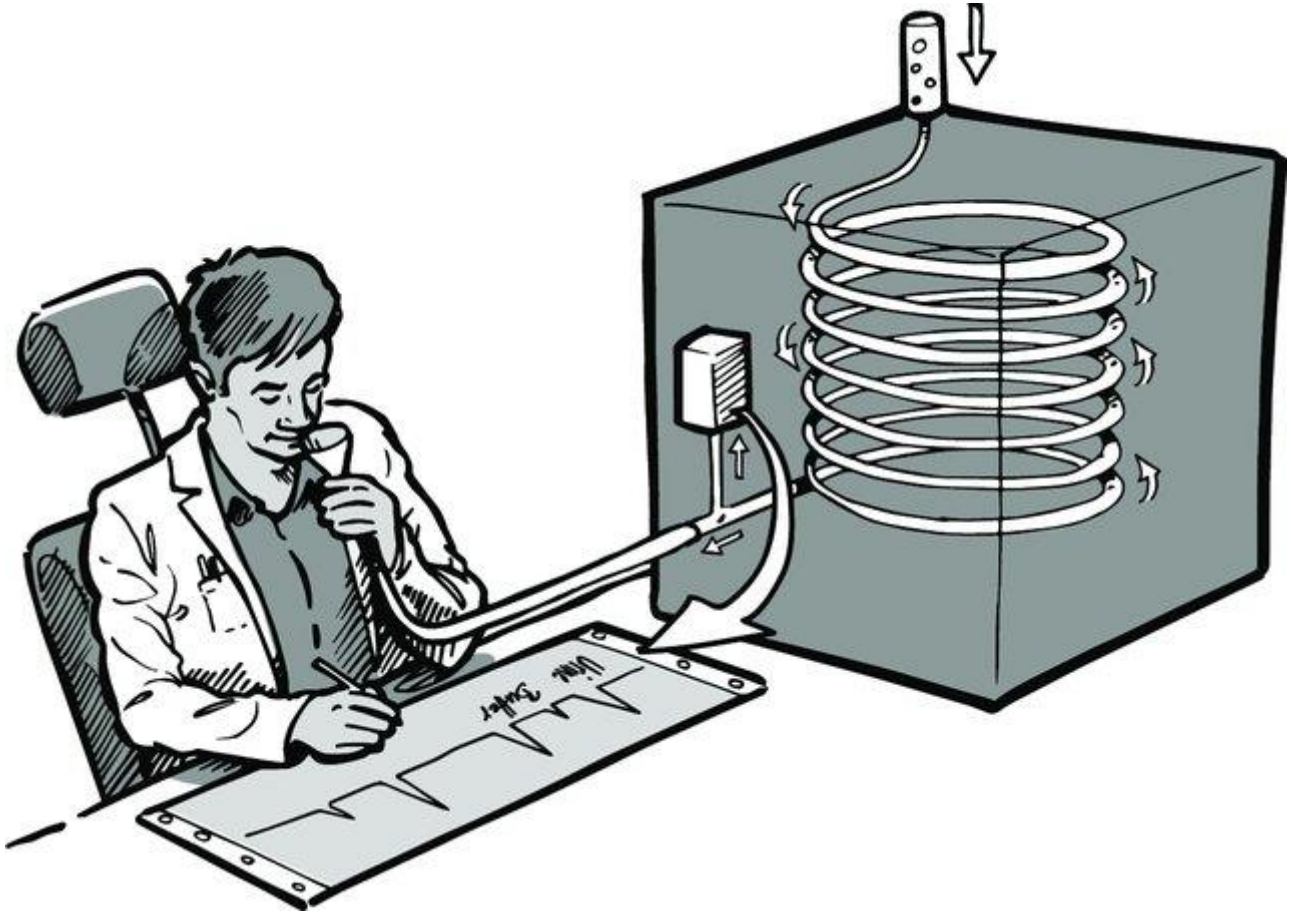

Image from:

Identification of Key Odorants in Used Disposable Absorbent Incontinence Products. March, 2017
Journal of wound, ostomy, and continence nursing: official publication of The Wound, Ostomy and Continence Nurses Society / WOCN 44(3)
DOI: 10.1097/WON.0000000000000325
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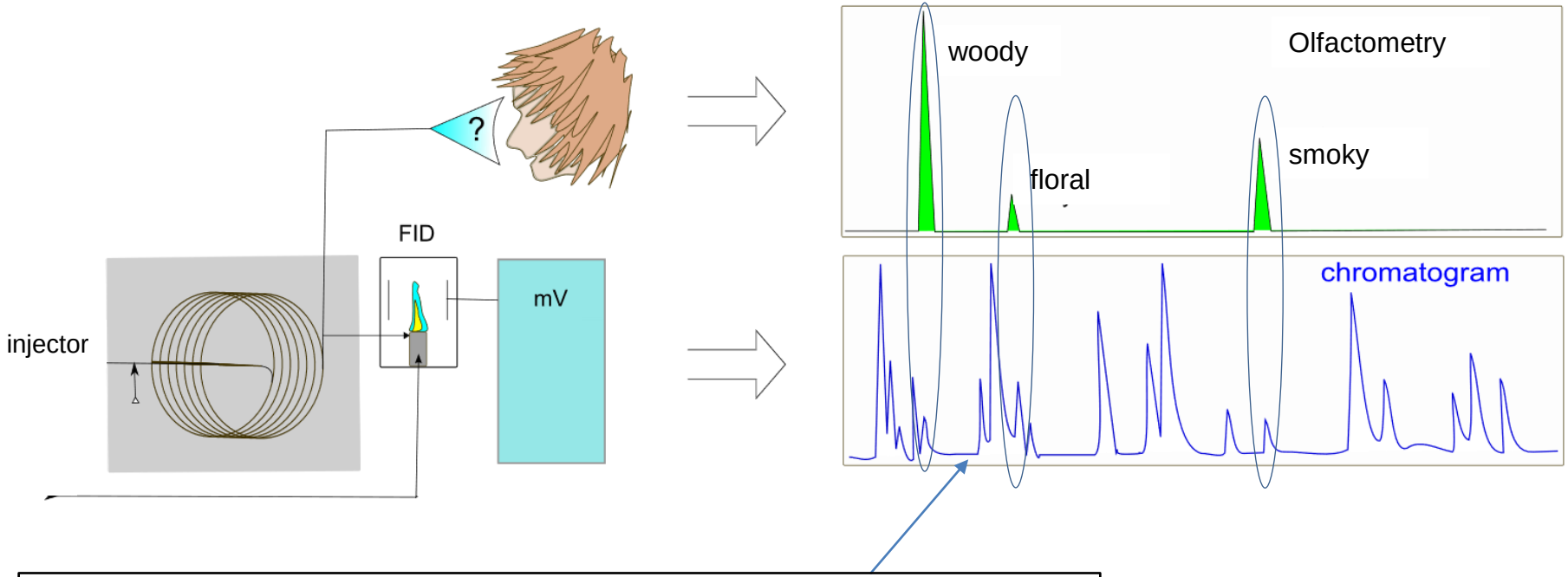
How does a GC-O work?



As coelution can occur, 2 dimensional GC is often used

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ESR8 - Next steps

-> Bibliographic review on the subject

-> Evaluate the state-of-the-art methods of characterization and washing processes

-> UG: different washing methods

-> Fraunhofer IVV: sensors

ESR 8 - Expected challenges:

437 VOCs
80 with odor-causative

1. Complexity: a wide range of compounds
2. How to achieve a washing method to remove ALL compounds
3. Complexity can affect sensor development

ESR 8 - Expected outcomes:

-> A better understanding on odour formation for recycled plastics

-> Optimization of washing processes to achieve high quality recyclates

-> Development of on-line sensors in order to have a better control of the recycling process

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