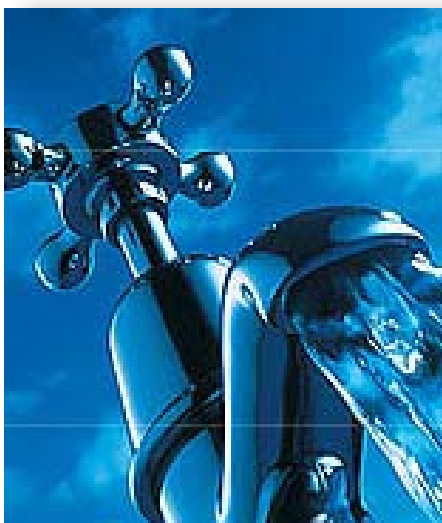


International Symposium for HPTLC
6th to 8th July 2011, Basel

Application of TLC-MS in water analysis



**Stefan C. Weiss^{1,2}, Wolfram Seitz¹,
Wolfgang Schulz¹ and Walter H. Weber¹**

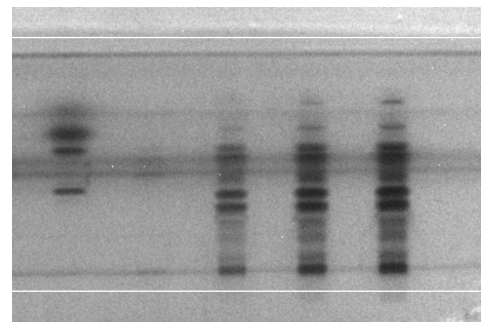
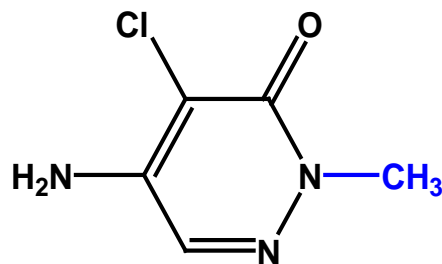
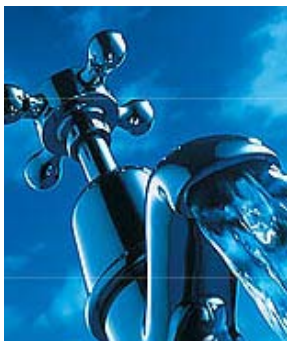
¹ Zweckverband Landeswasserversorgung
Laboratory for Operation Control and Research
Langenau, Germany

² Leuphana Universität Lüneburg
Institute for Environmental Chemistry, Germany

E-Mail: seitz.w@lw-online.de

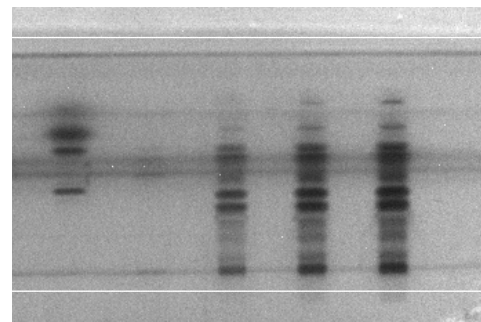
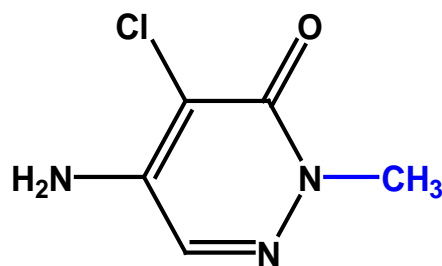
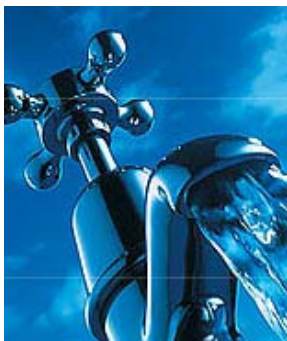
Structure

- Introduction
- Ground water contamination from synthetic turf
- Ozonation reaction products
- Conclusion

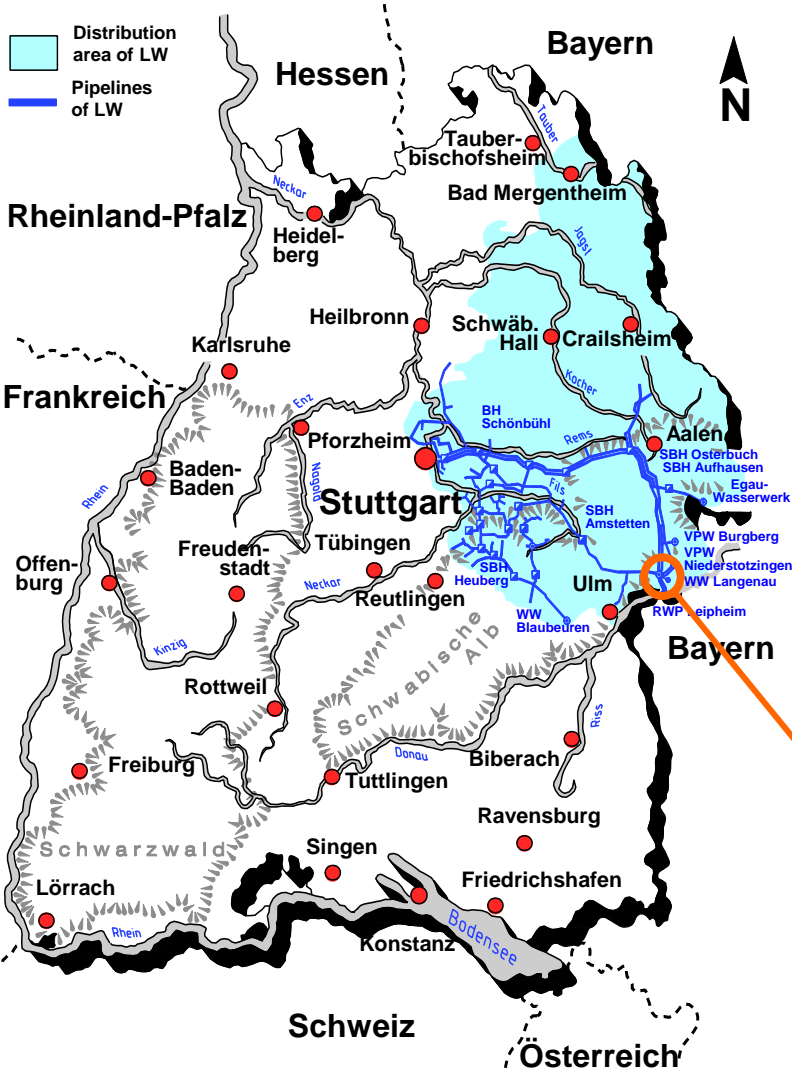


Structure

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Distribution area of LW in South West Germany



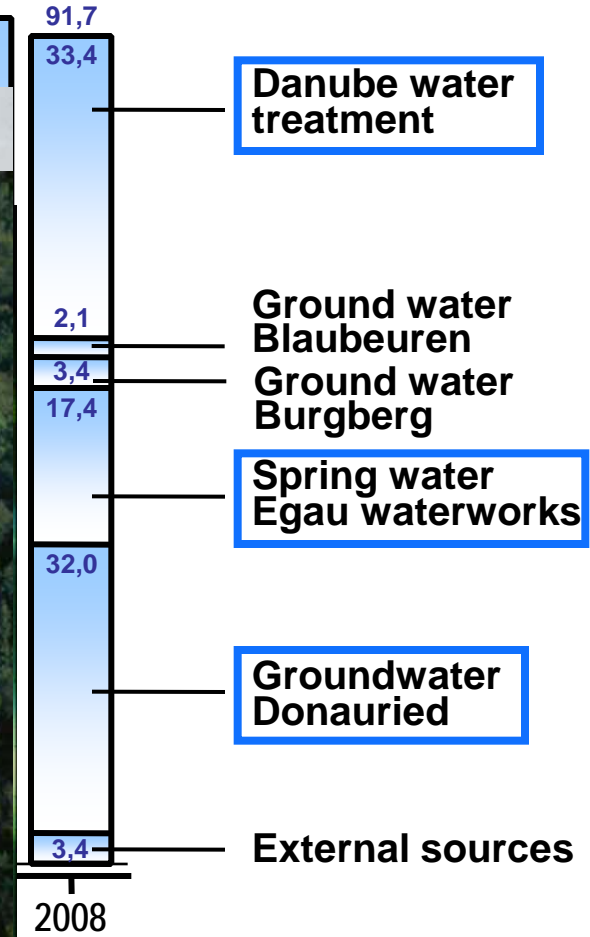
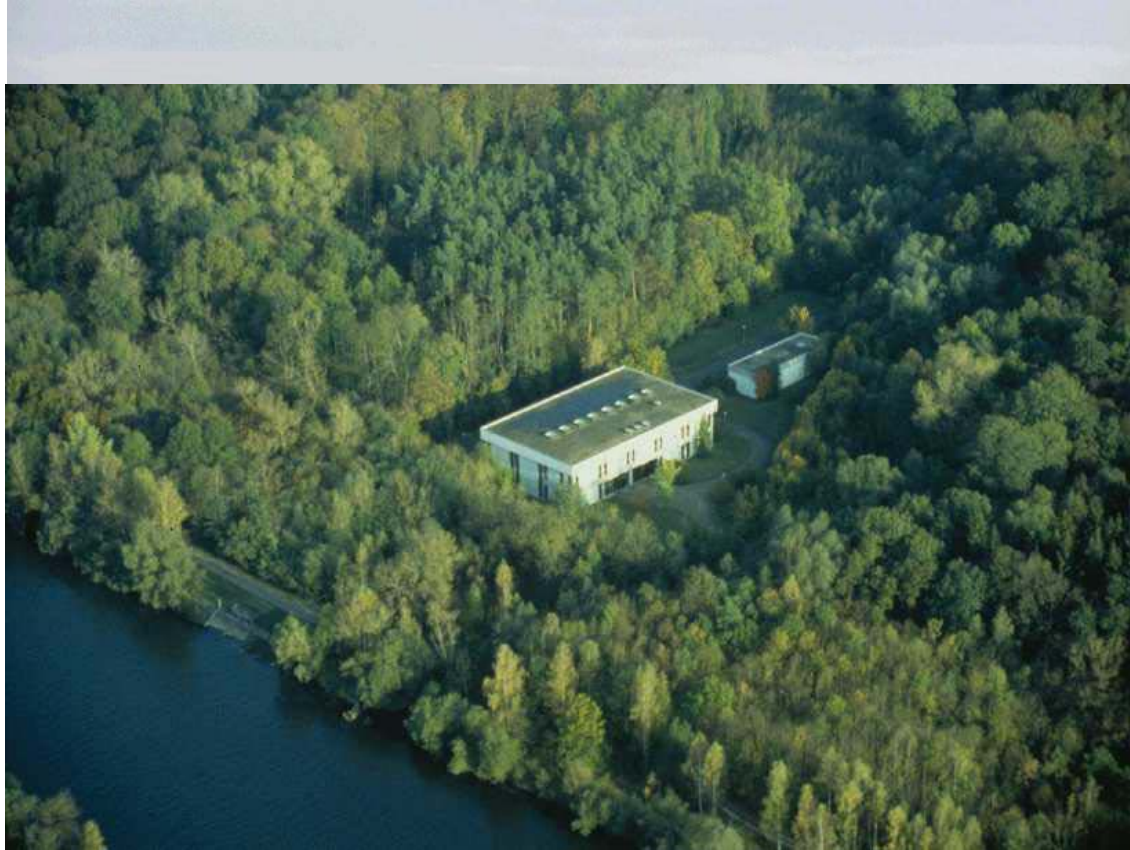
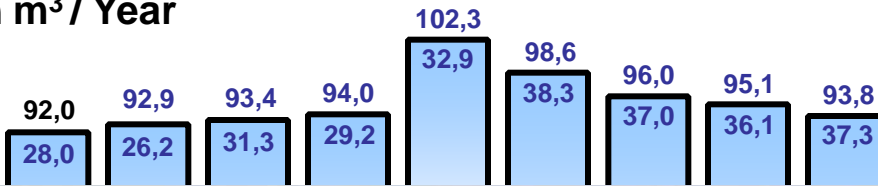
- Distribution area in South West Germany
- 3 Million customers within distribution area
- Long-distance water fraction approx. 50%

Langenau Waterworks

Water treatment from different resources

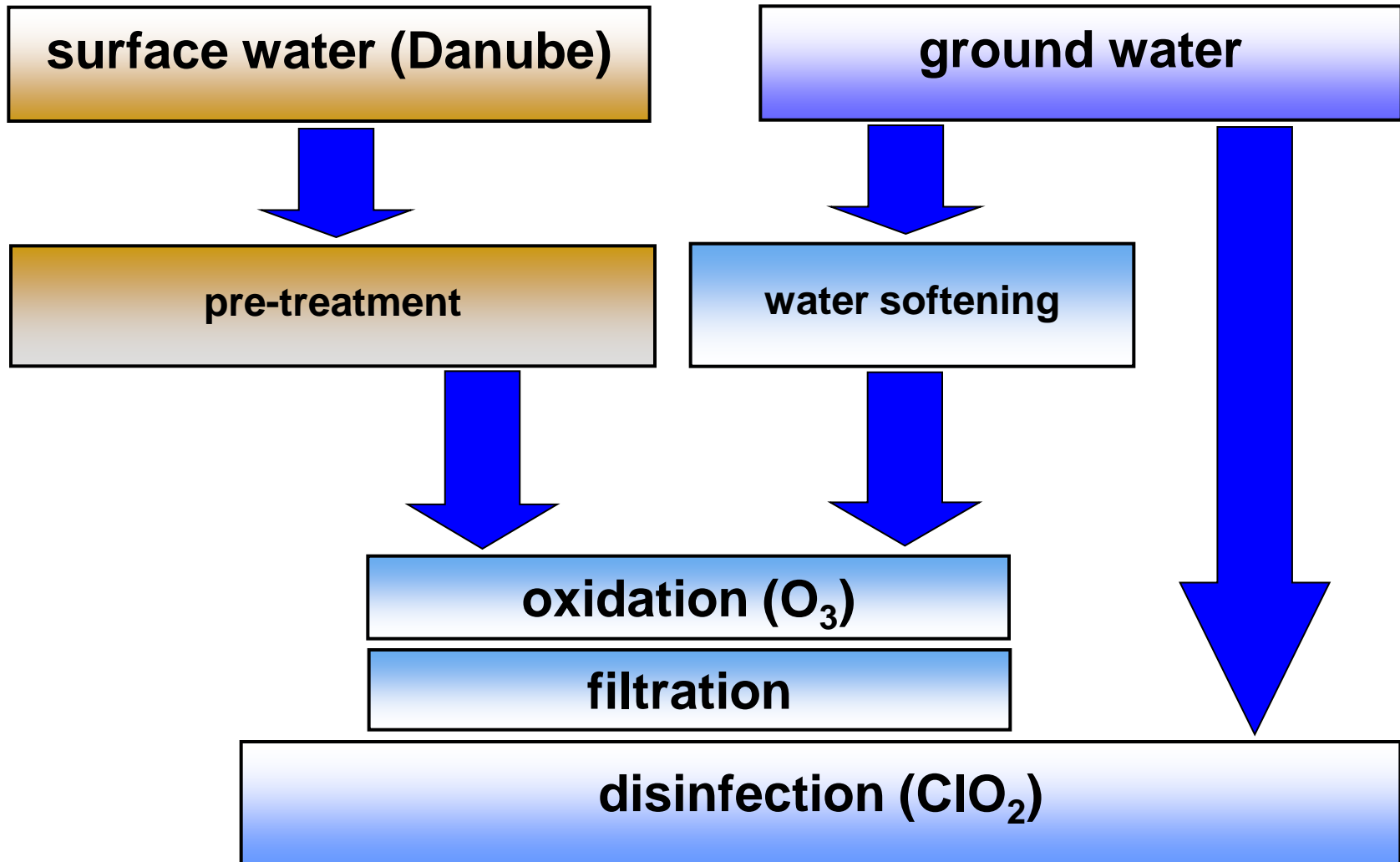
Million m³ / Year

100
90

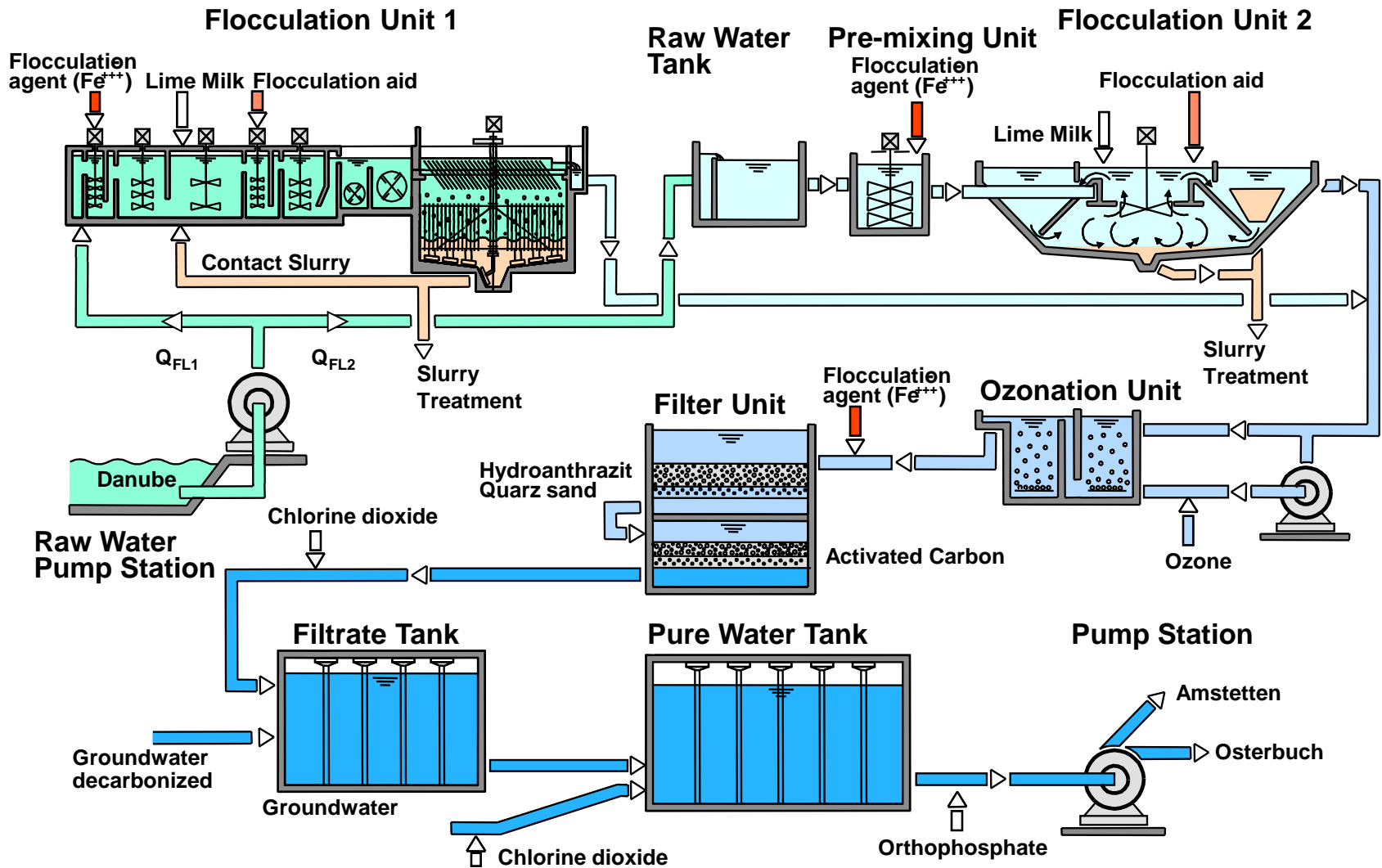


2008

Water treatment at Langenau waterworks

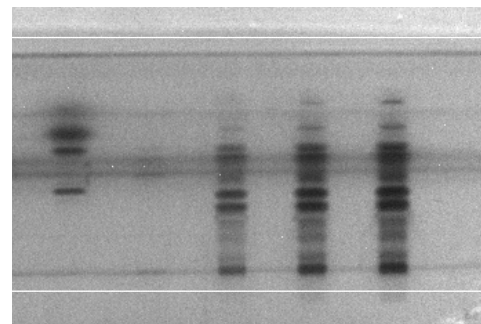
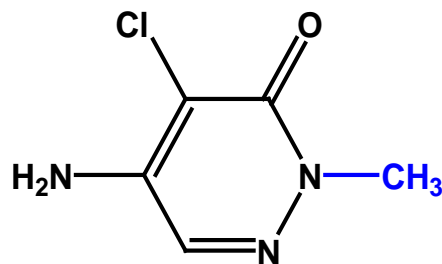
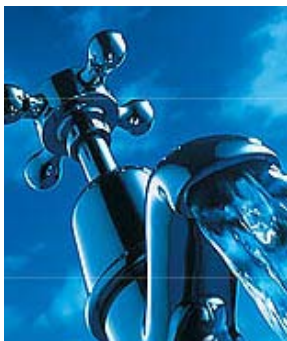


Treatment of Danube water at Langenau waterworks

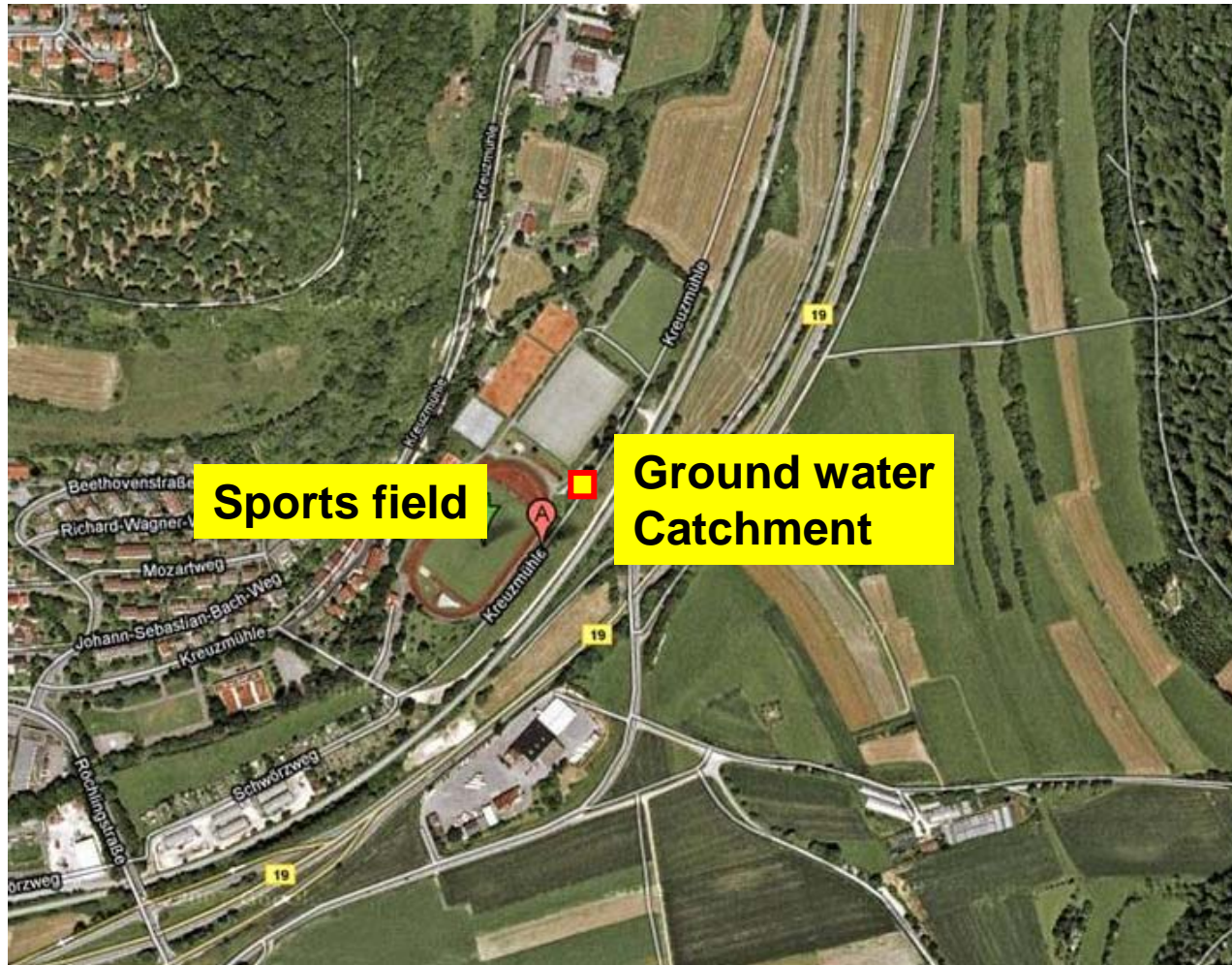


Structure

- Introduction
- **Ground water contamination from synthetic turf**
- Ozonation reaction products
- Conclusion



Aerial photo of the region of interest



Ref.: Google Maps

Simulation of leaching synthetic turf with water

Synthetic turf:

PUR rubber granulate (elastic layer)



Leaching test:

(analog DIN 38414-S4)

Elution of 40 g sample with 80 g water

Duration: 24 h

Liquid/liquid extraction of the eluate

Extraction solvent: Methyl tert-butyl ether

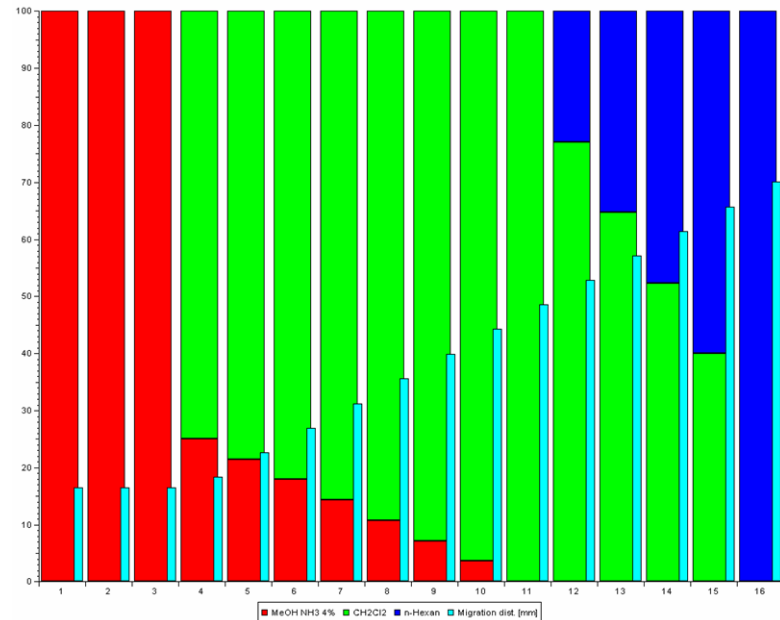
Blank: Ultra pure water



HPTLC/AMD analysis

Chromatography:

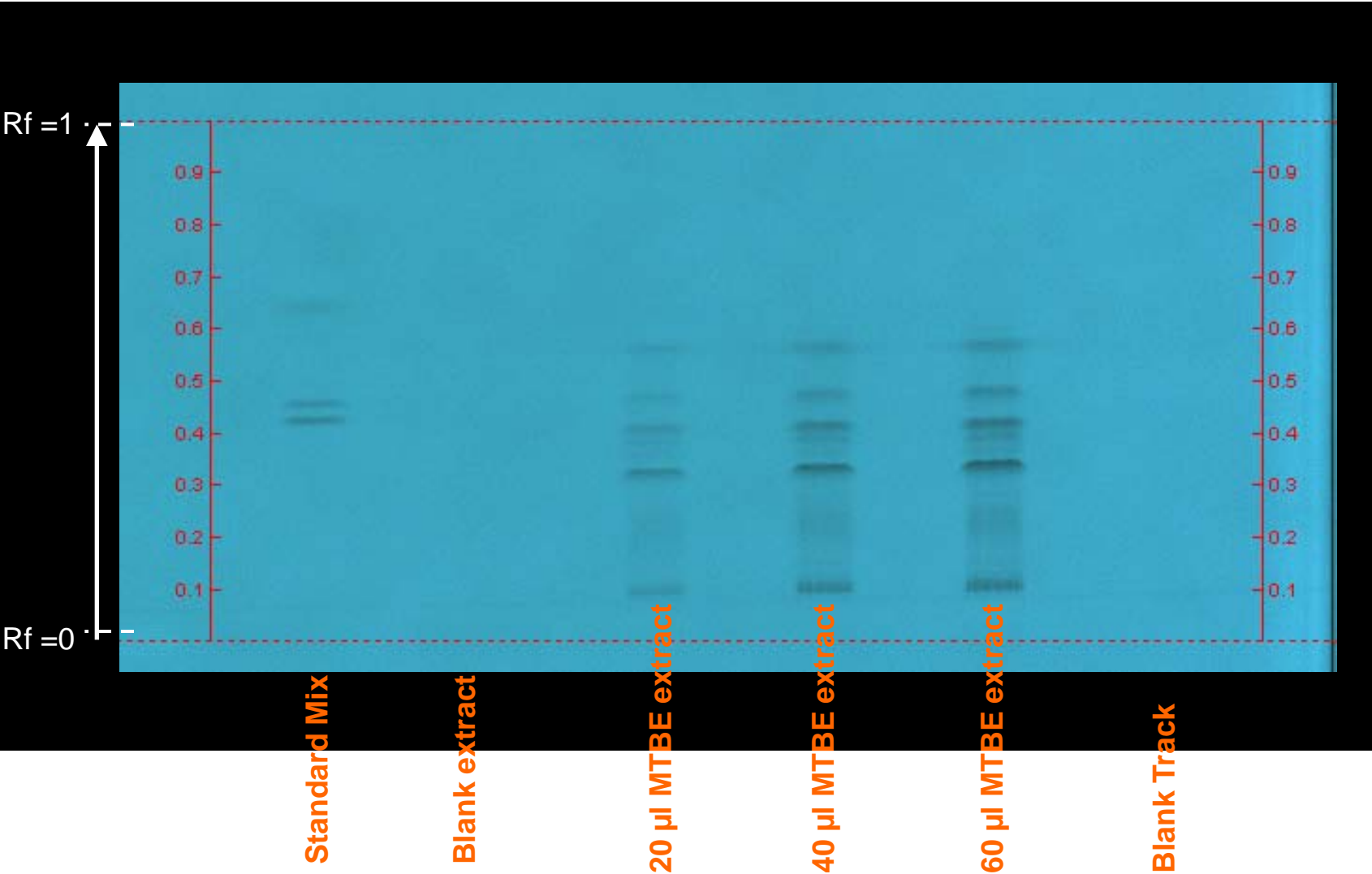
Eluents: MeOH:NH₃ (4%)
Dichloromethane
n-Hexane



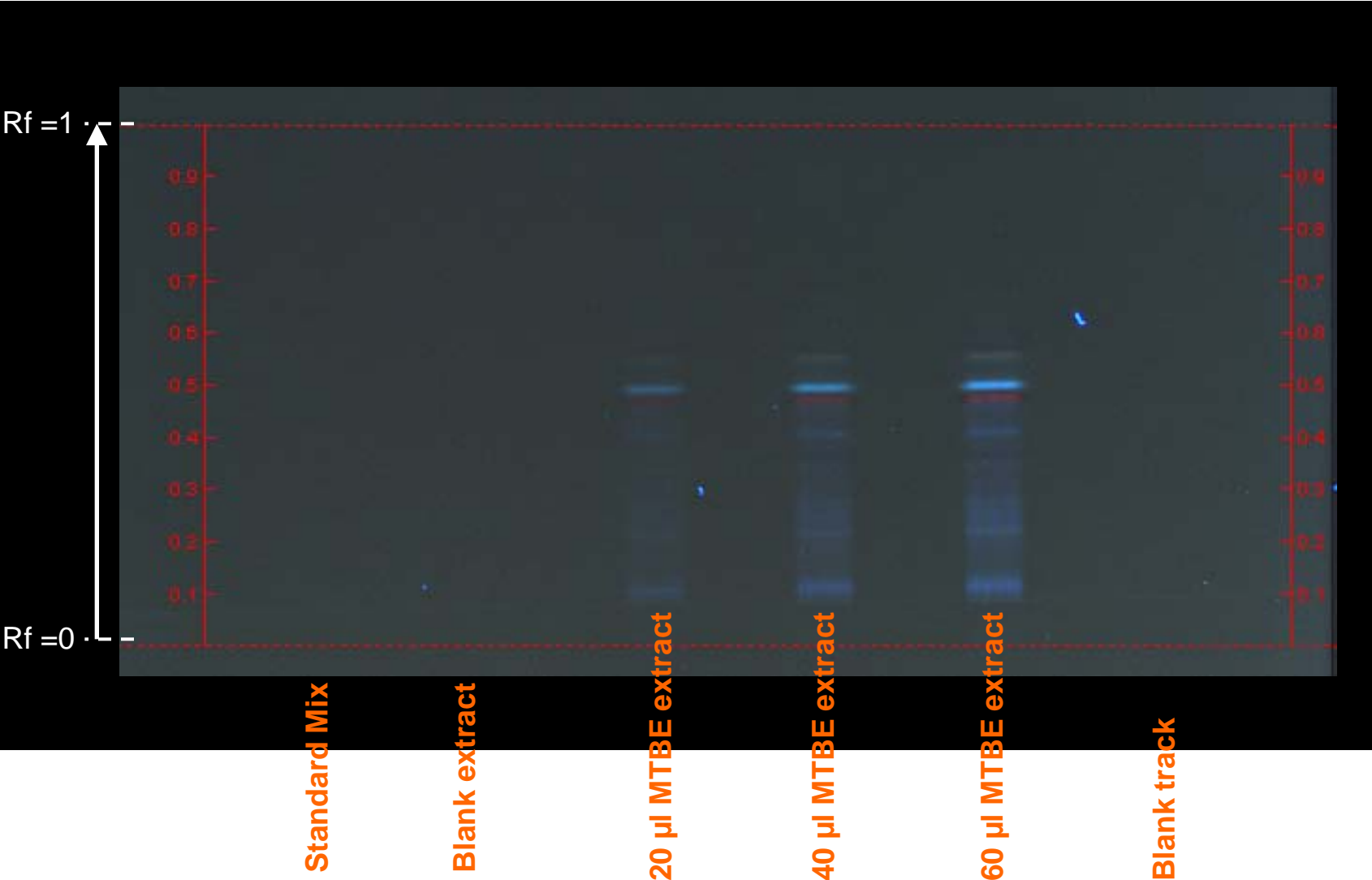
Detection:

- UV absorption (multiple wavelength scan)
- Fluorescence quenching at 254 nm
- Fluorescence, excitation at 366 nm
- Luminescence inhibition test

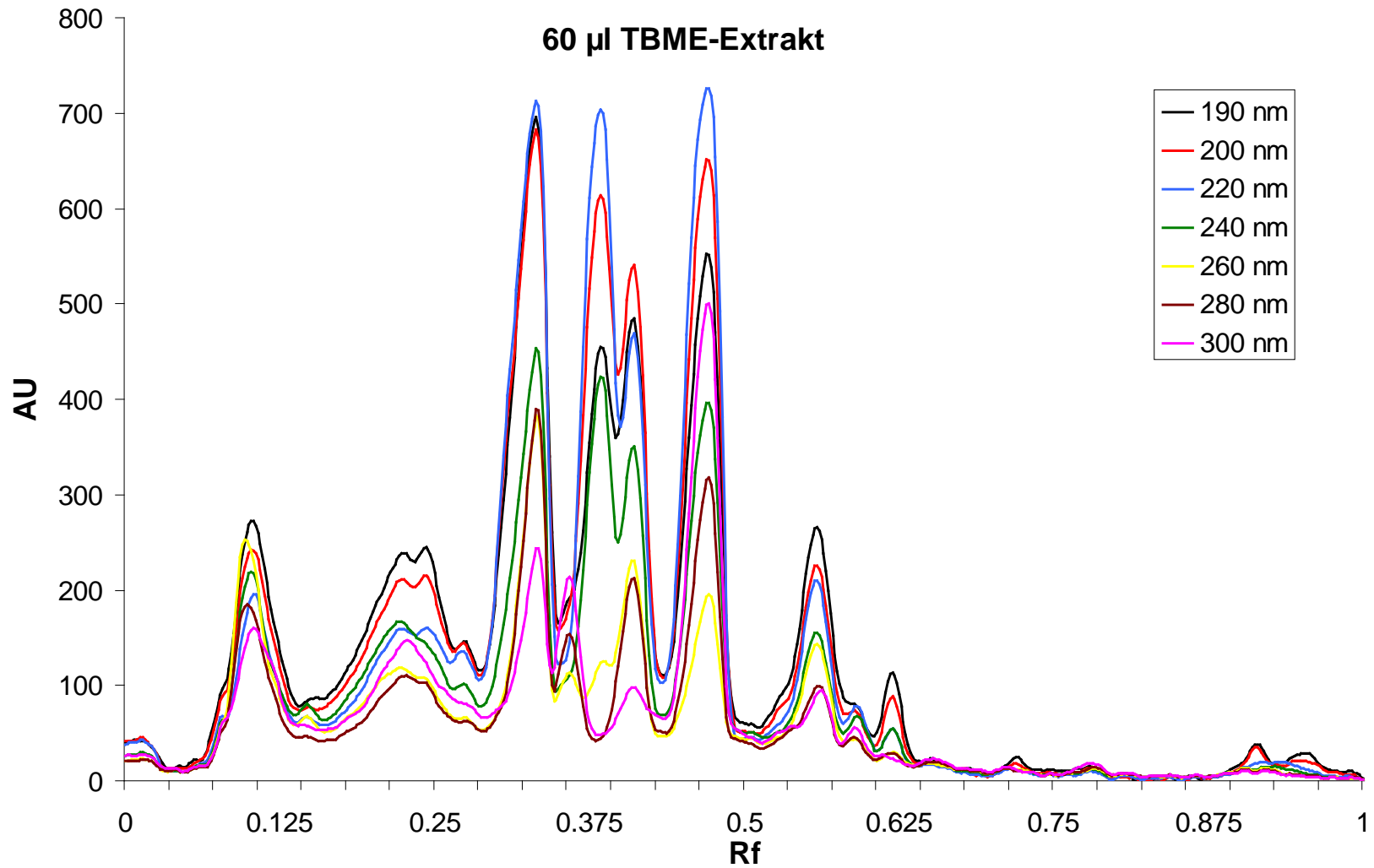
Fluorescence quenching at 254 nm



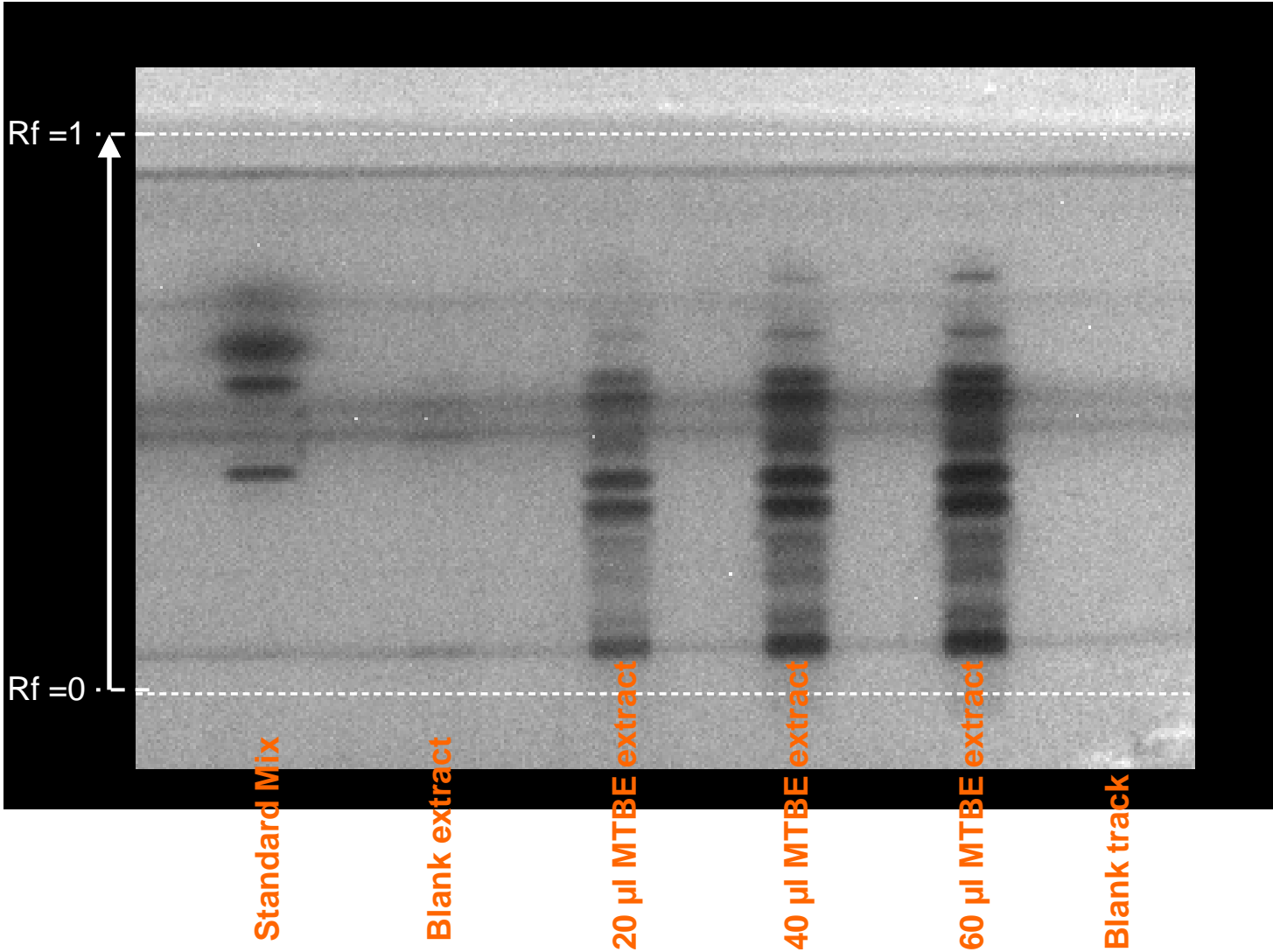
Fluorescence (excitation at 366 nm)



UV absorption (multiple wavelength scan)



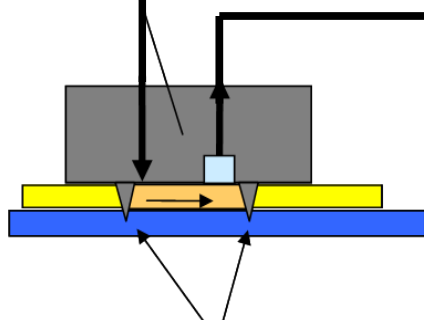
Detection of luminescence inhibition (*Vibrio fischeri*)



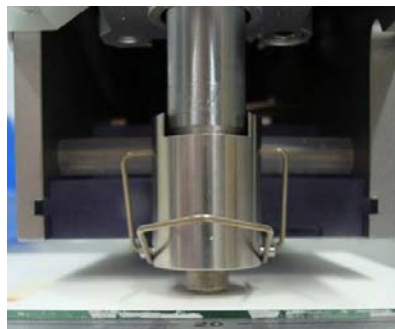
Transfer of substances via HPTLC-MS interface and MS analysis

Eluent from HPLC pump

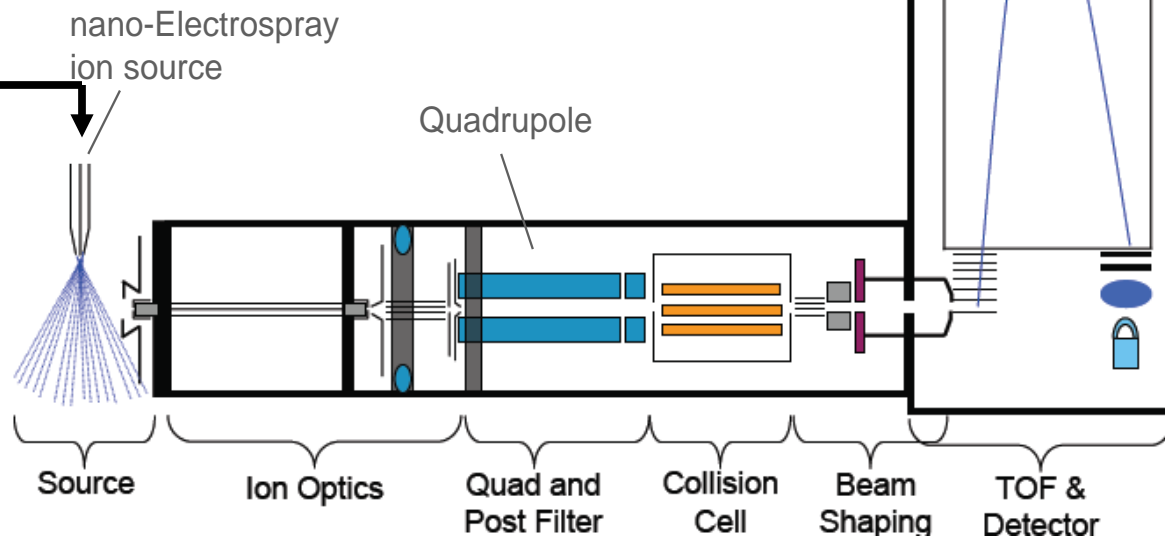
Stempel mit Schneide und Filter



Dichtung mit dem Träger

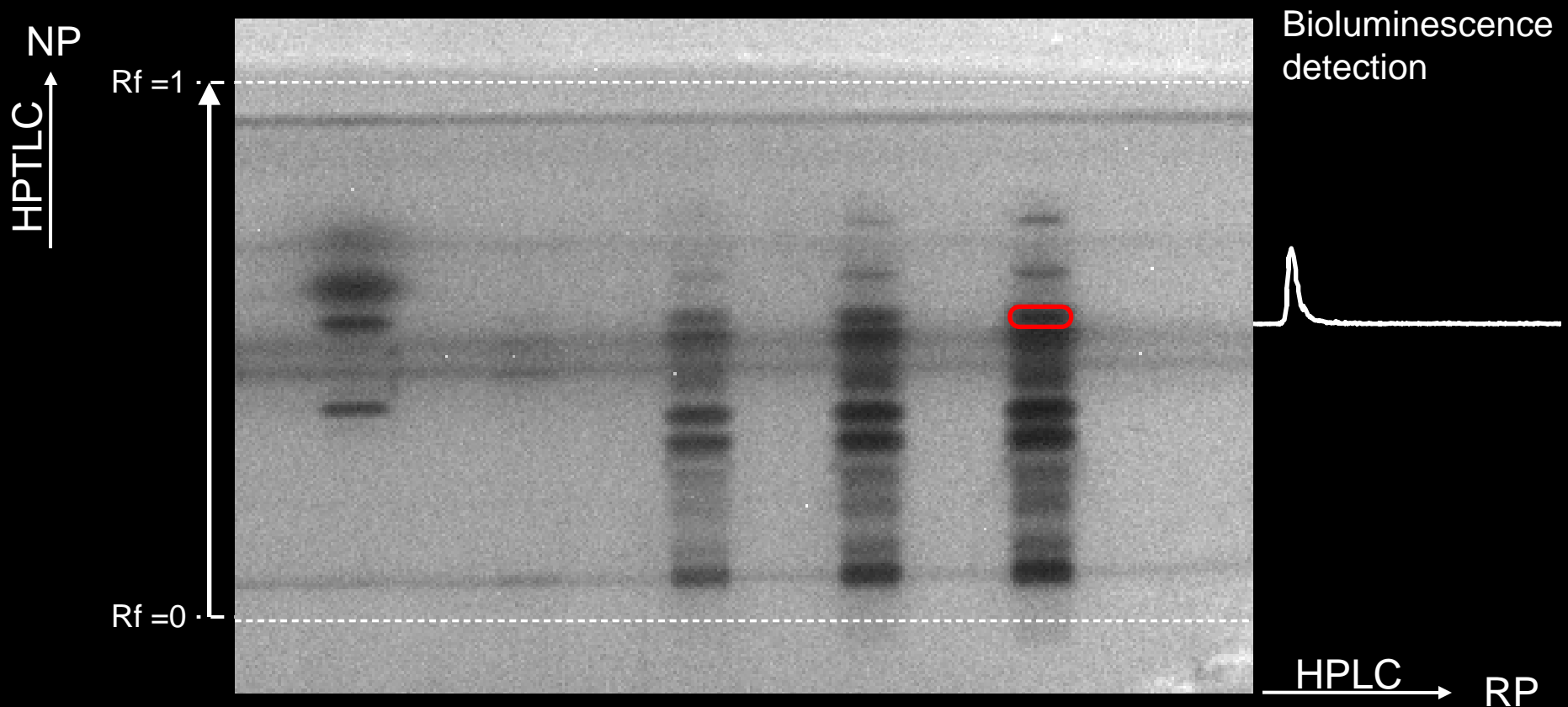


Tandem mass spectrometer with full-scan capability
Mass accuracy: 2 ppm

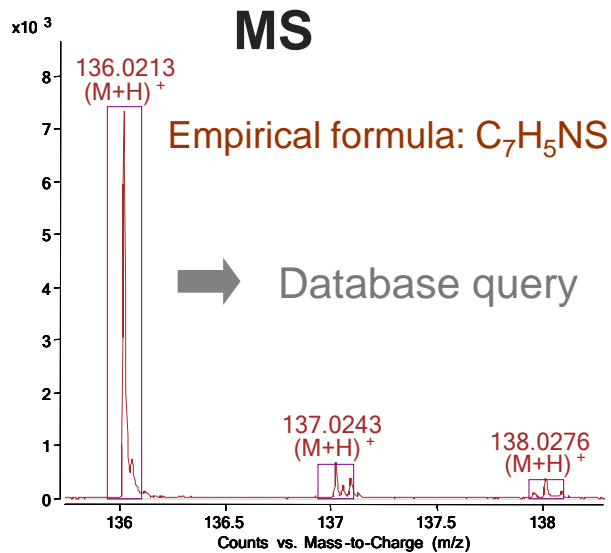


H. Luftmann (2004) Anal. Bioanal Chem., 378, 964

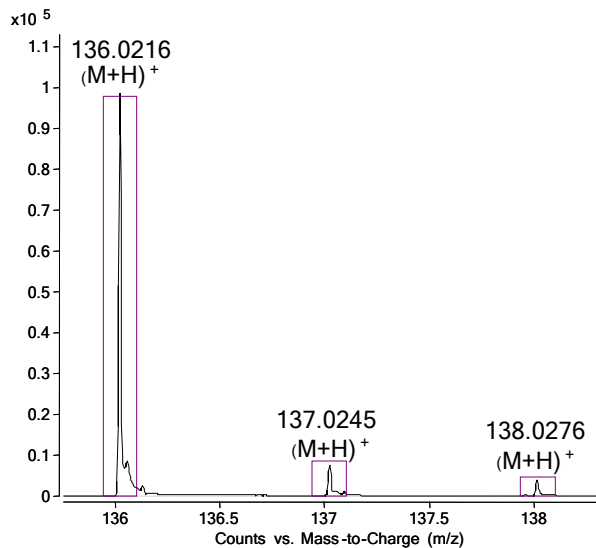
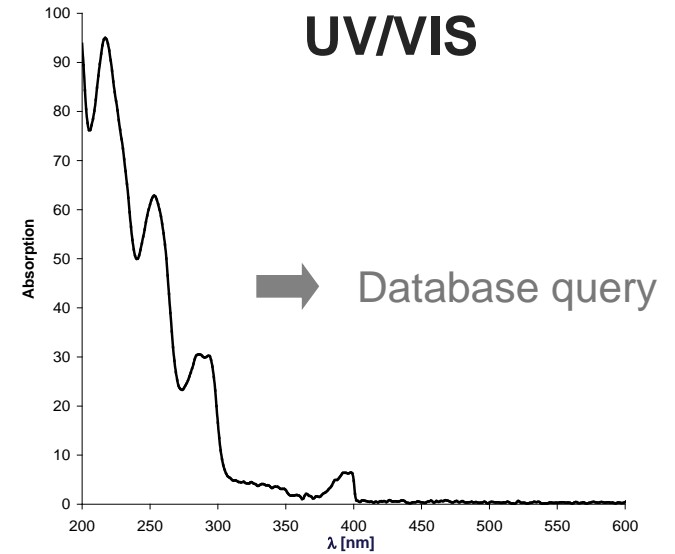
Detection of luminescence inhibition (*Vibrio fischeri*) and transfer of the substances via HPTLC-MS interface to MS



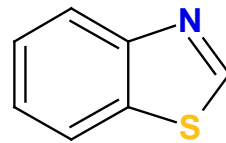
Identification of the unknown compound



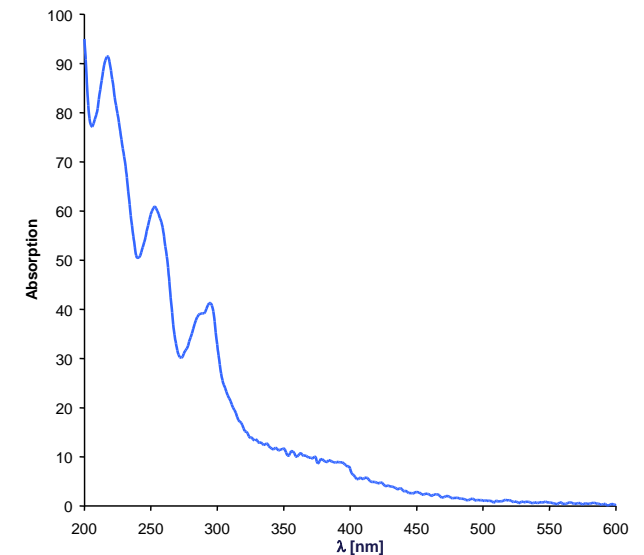
Sample



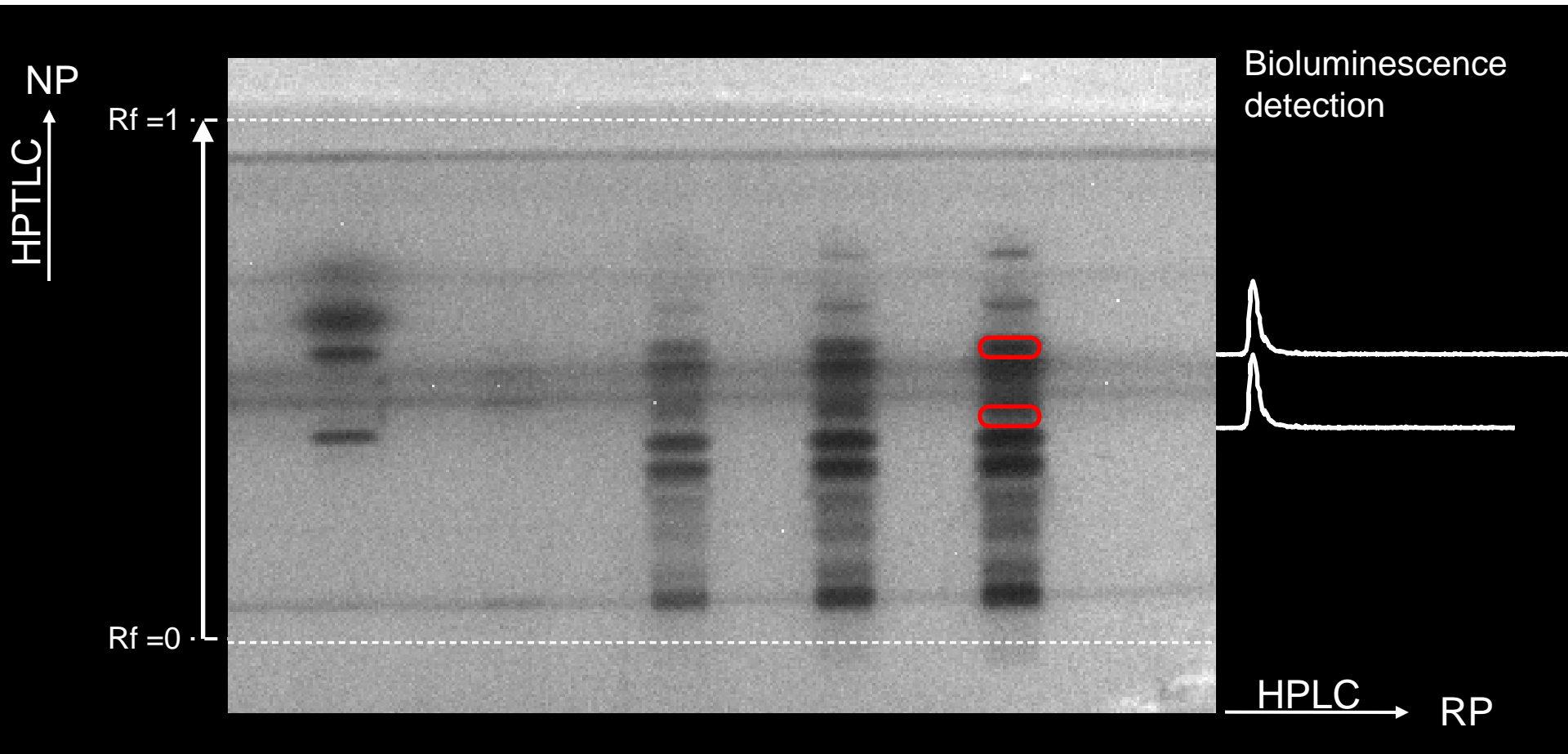
Reference



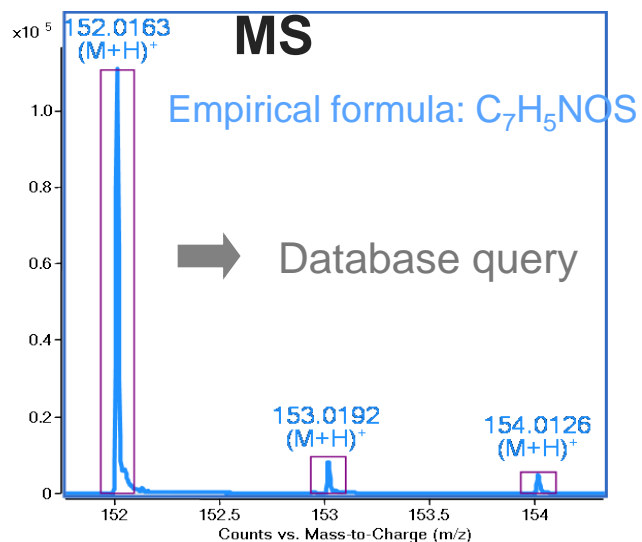
Benzothiazol



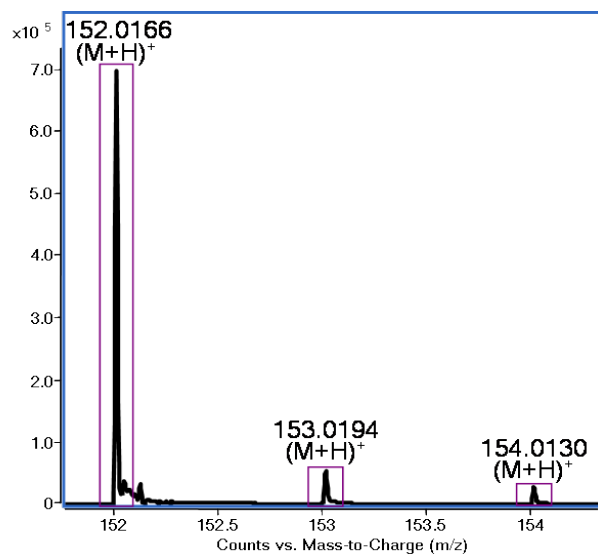
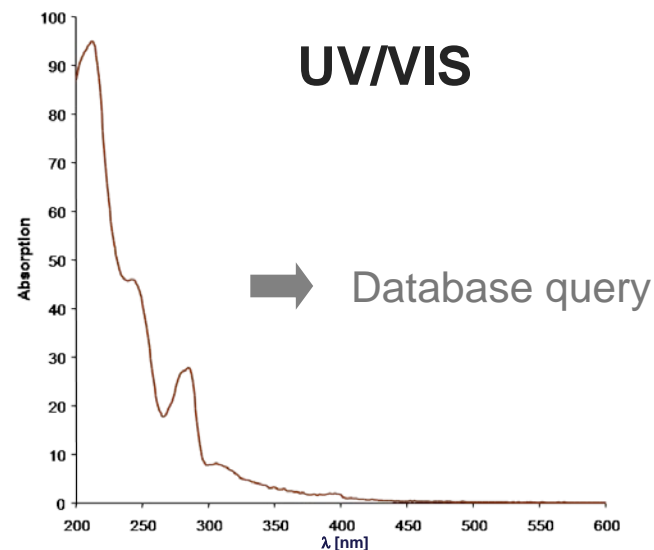
Detection of luminescence inhibition (*Vibrio fischeri*) and transfer of the substances via HPTLC-MS interface to MS



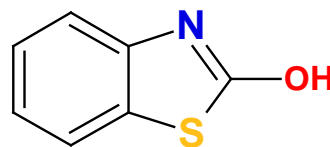
Identification of the unknown compound (II)



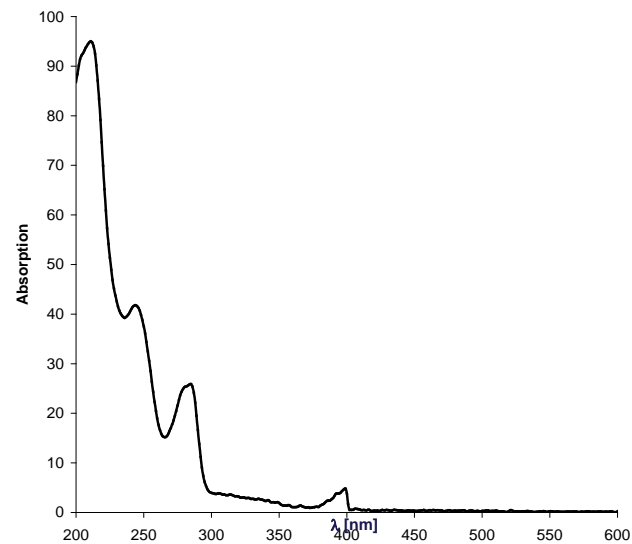
Sample



Reference

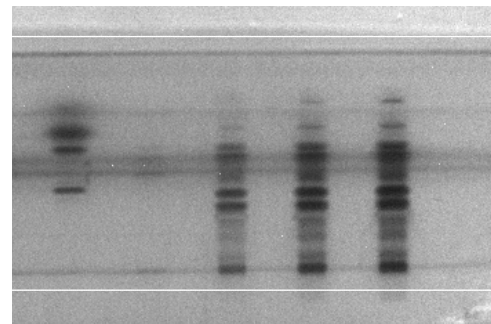
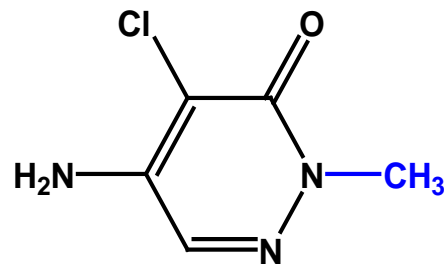


2-Hydroxybenzothiazol

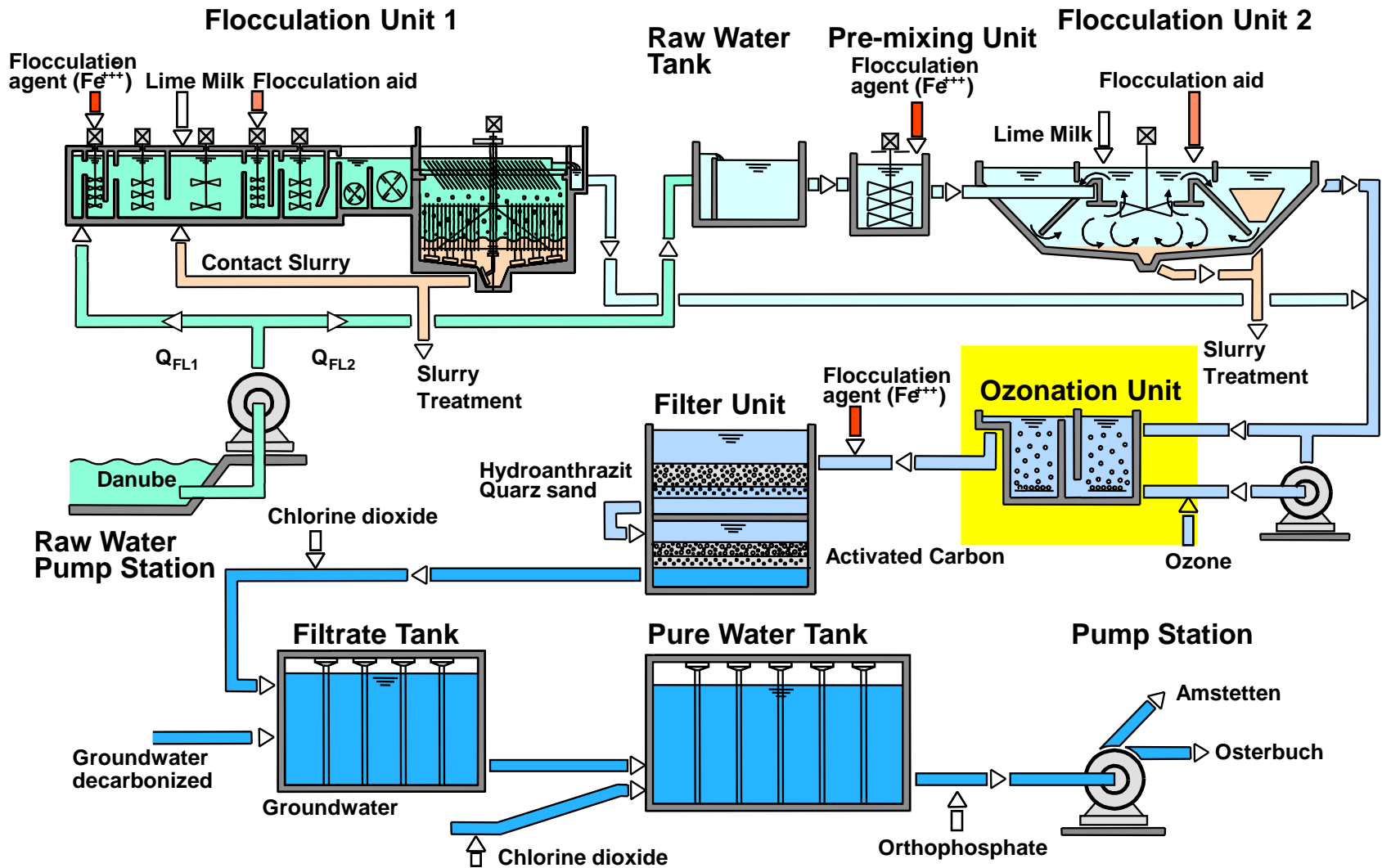


Structure

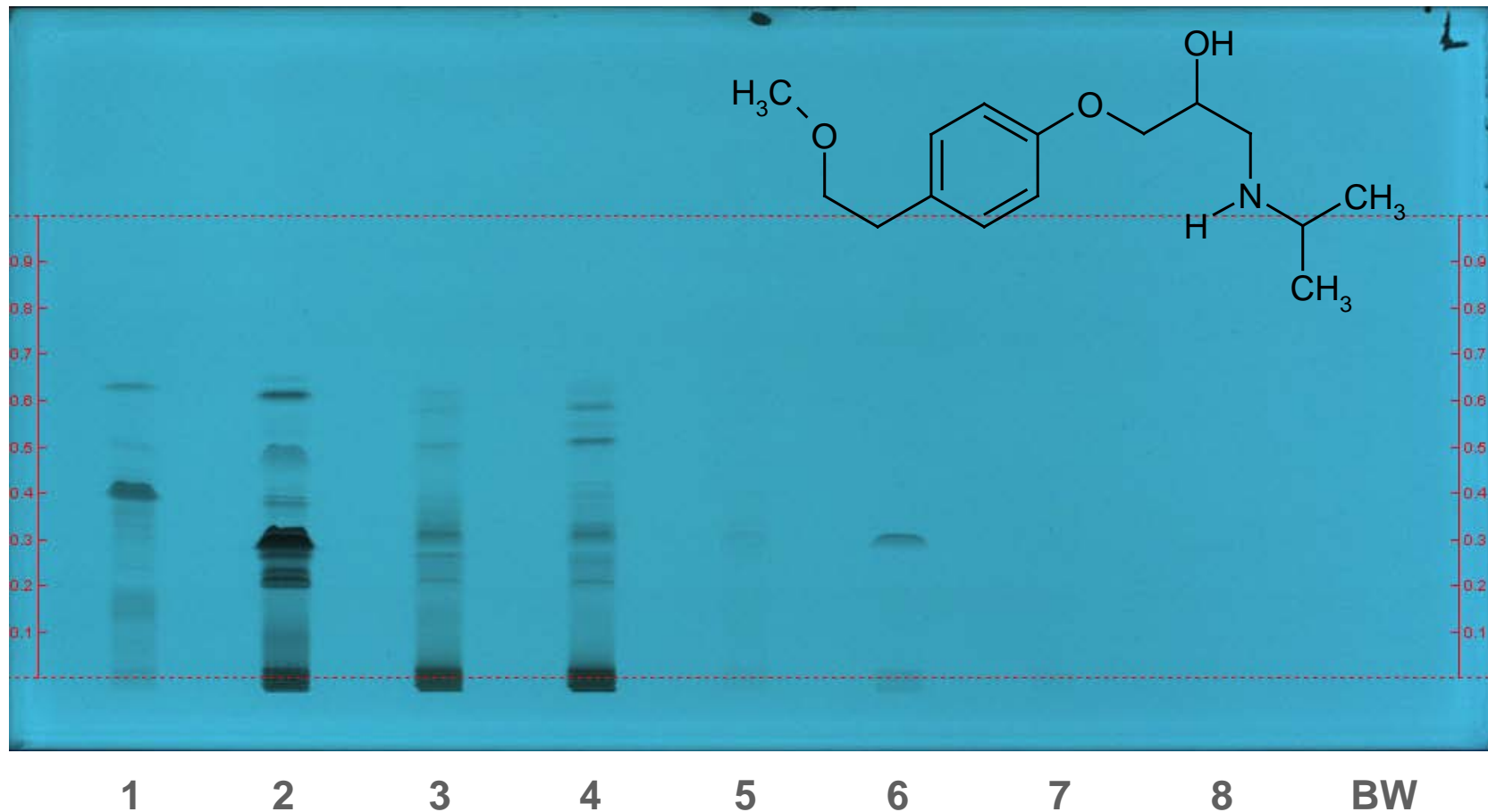
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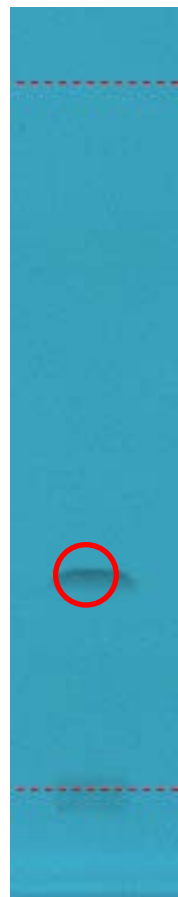
Treatment of Danube water at Langenau waterworks



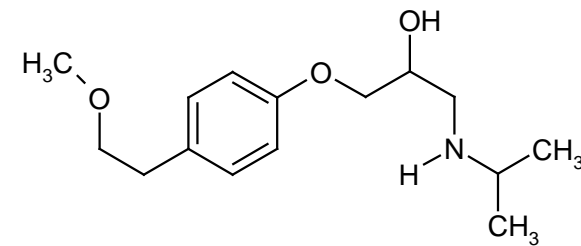
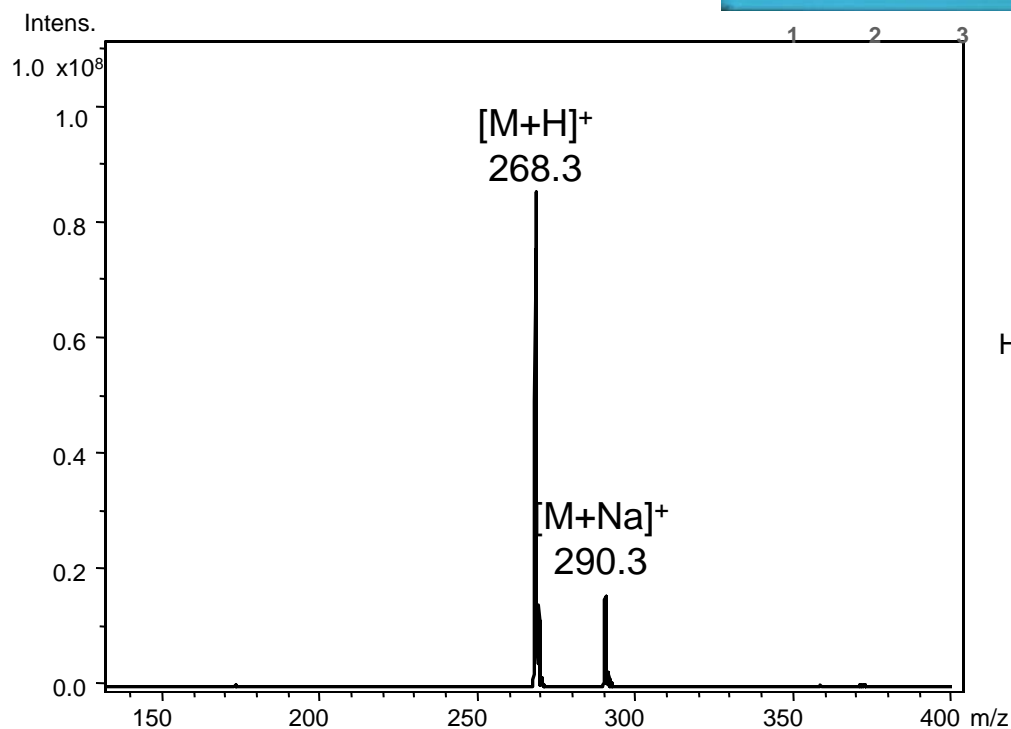
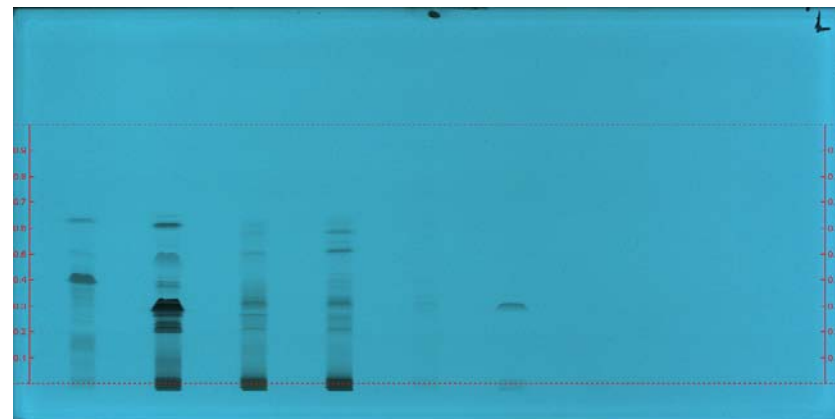
Oxidation of Metoprolol by ozone



TLC-MS analysis of metoprolol



Track 6

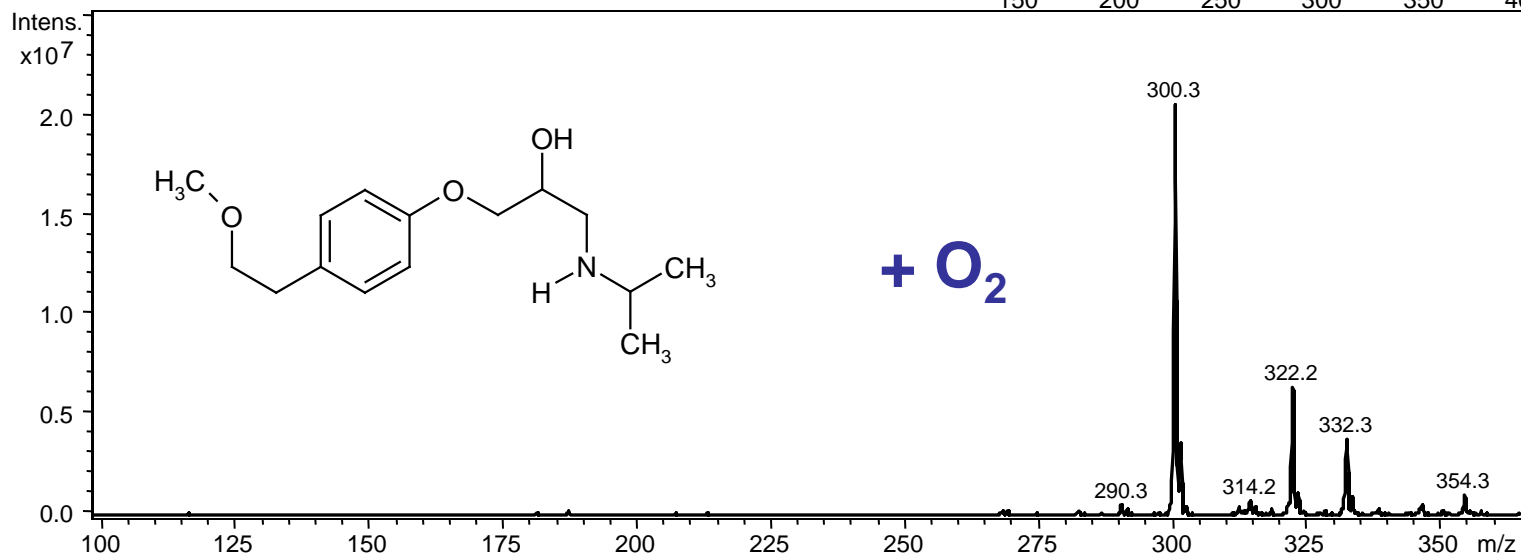
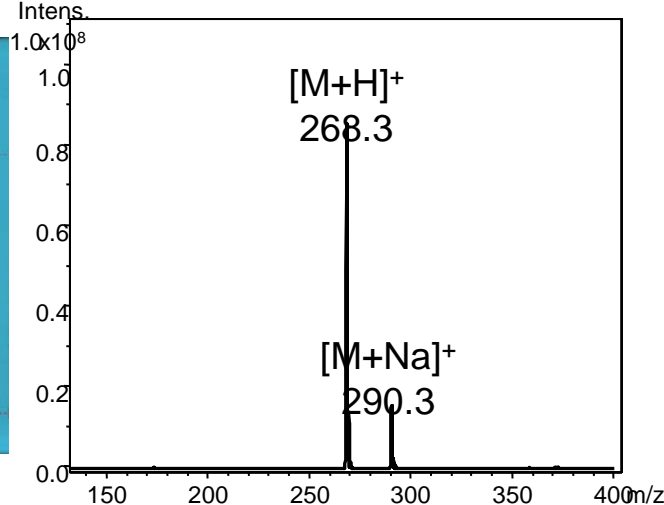
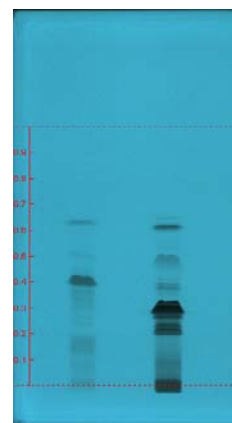


Metoprolol

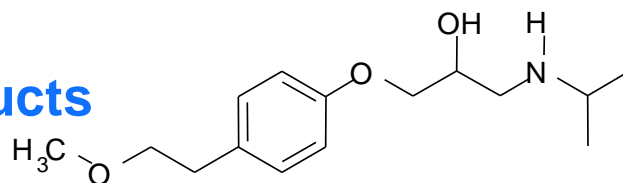
TLC-MS analysis of oxidation by-products



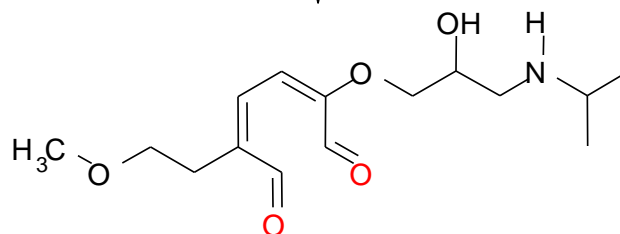
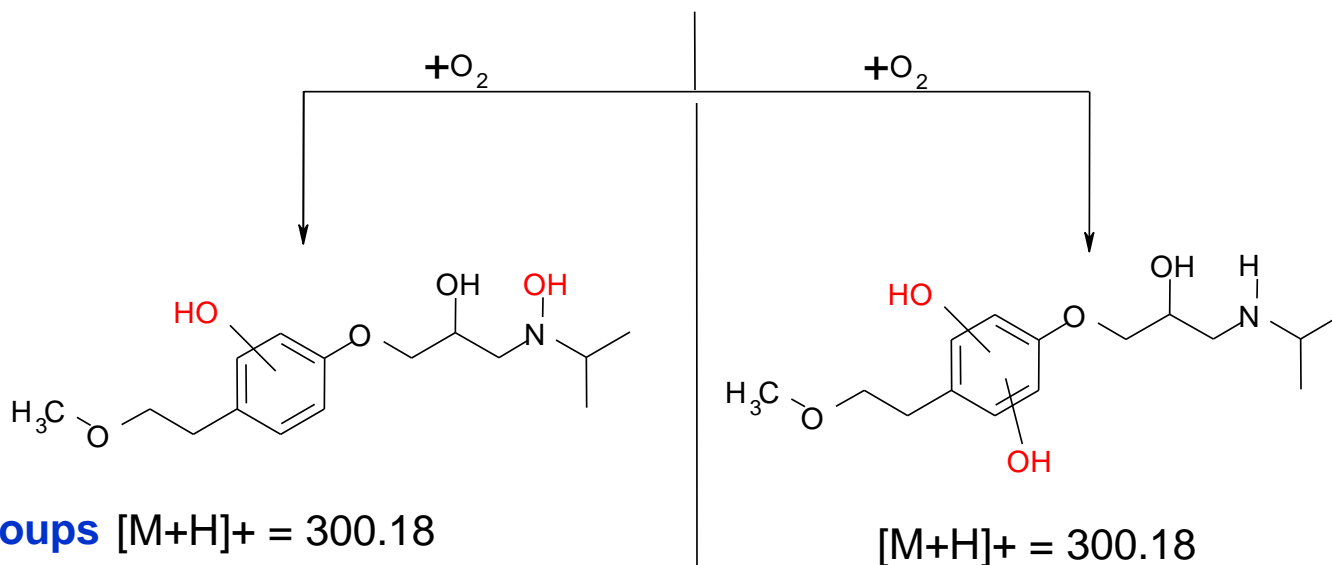
Track 2



Metoprolol and oxidation by-products

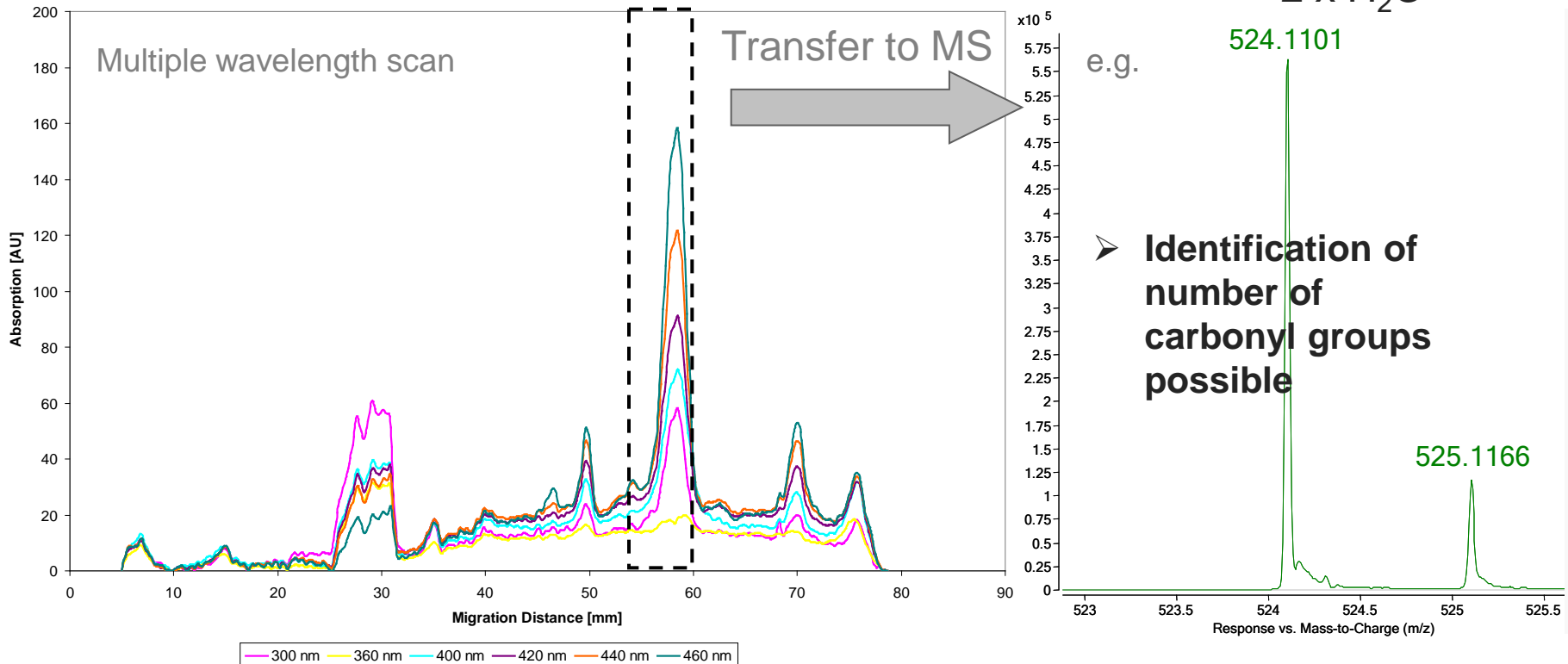
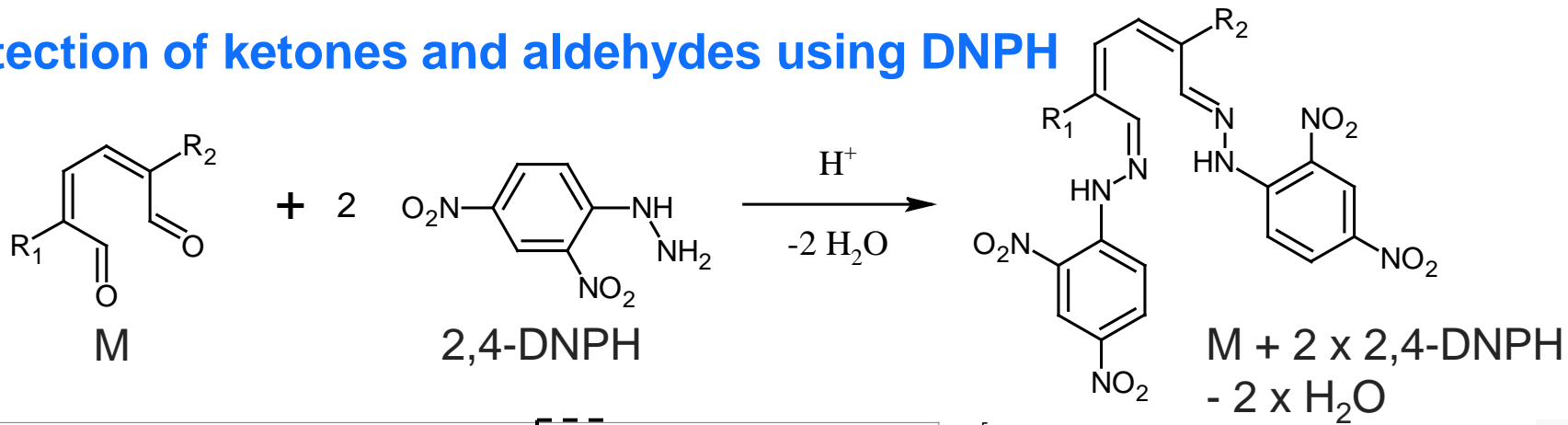


$[M+H]^+ = 268.19$

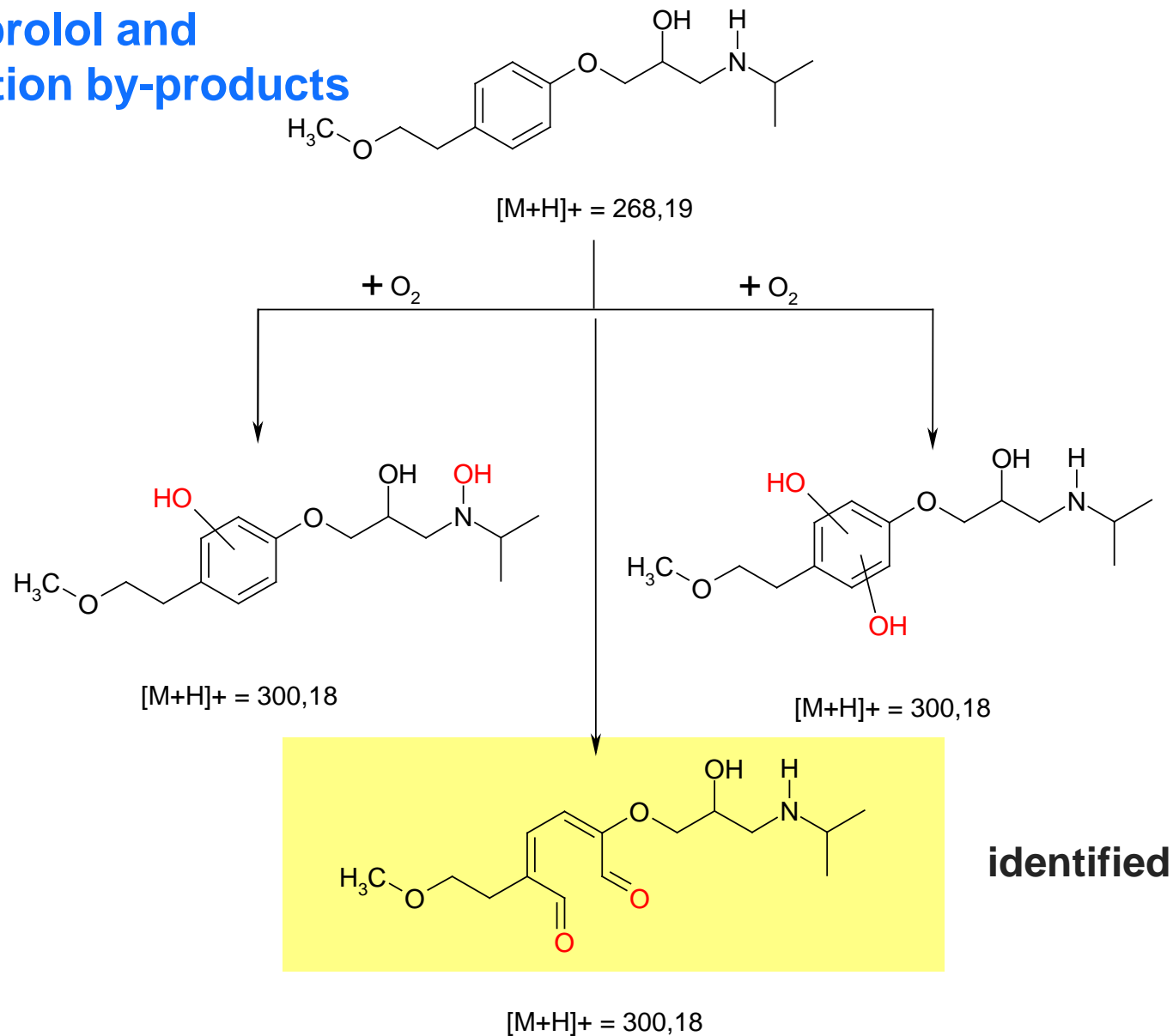


$[M+H]^+ = 300.18$ **Aldehyde groups**

Detection of ketones and aldehydes using DNPH

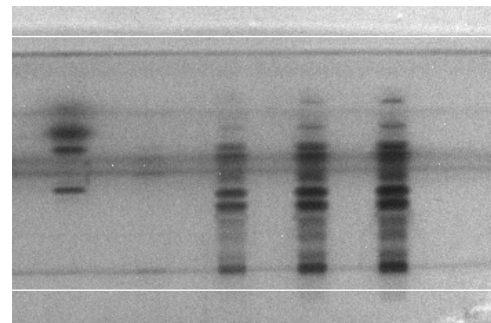
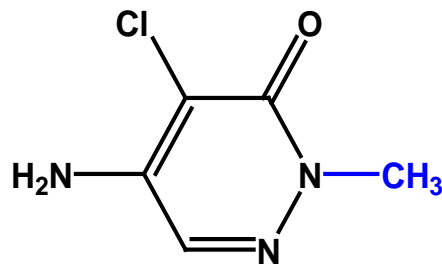
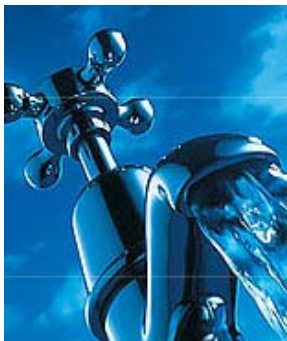


Metoprolol and oxidation by-products

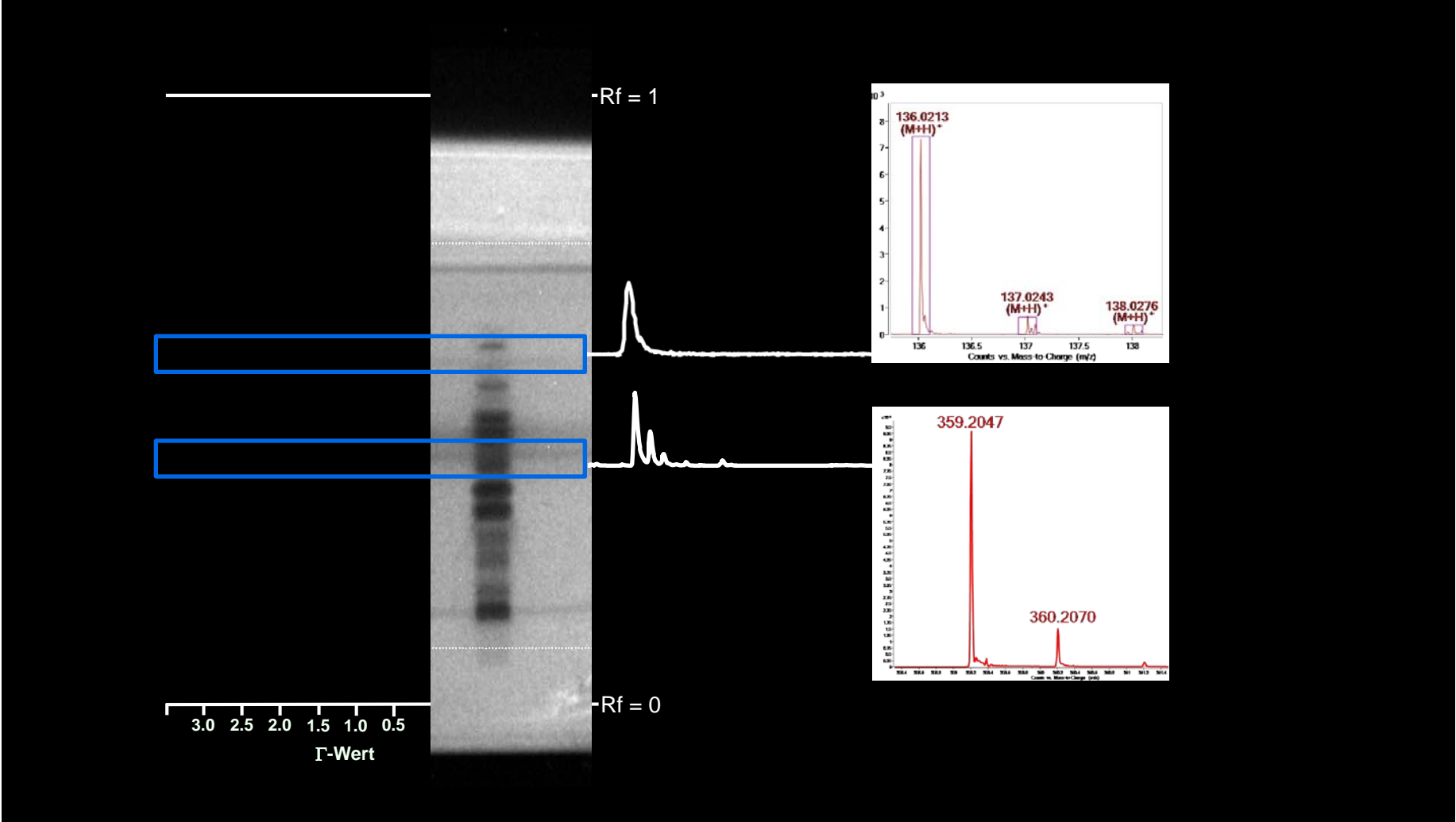


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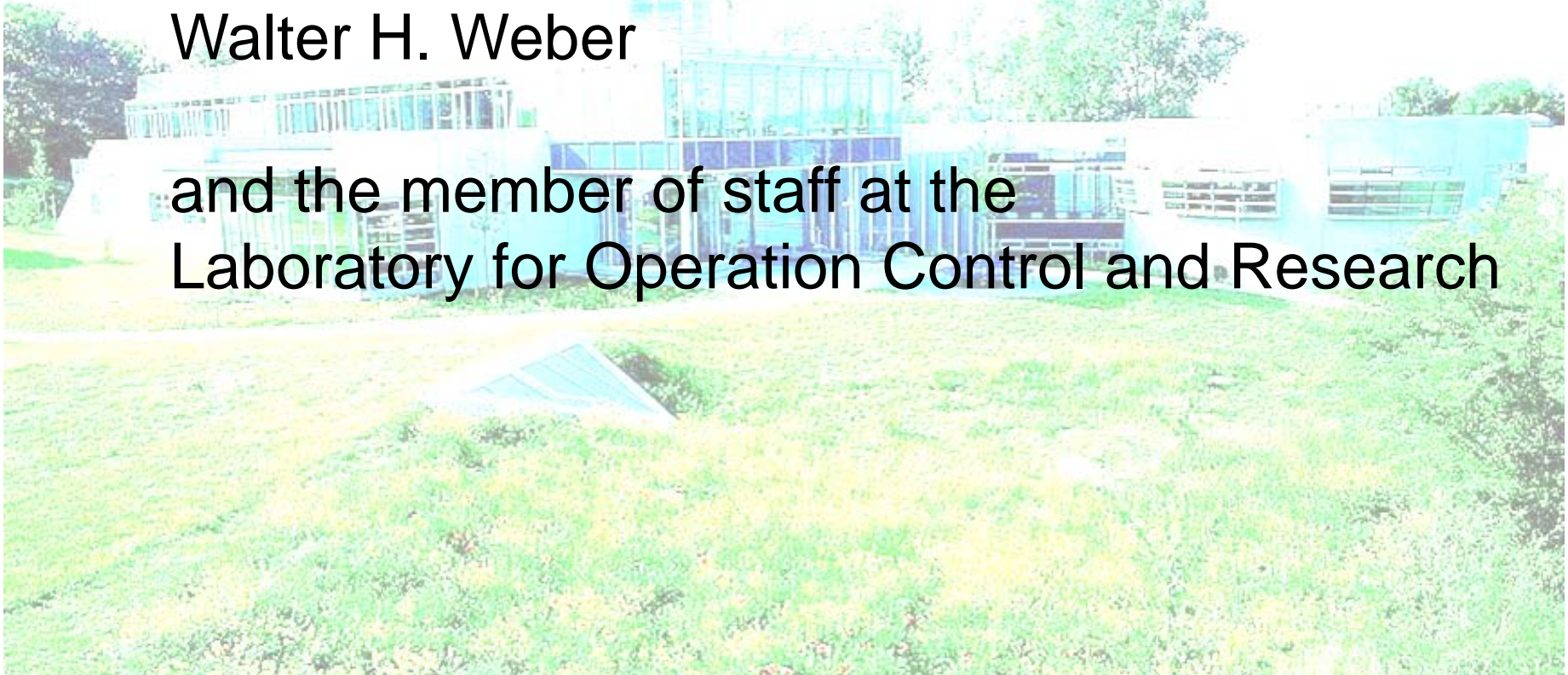
Conclusion



Acknowledgments

Roger Albert
Alexander Müller
Walter H. Weber

and the member of staff at the
Laboratory for Operation Control and Research



Event note

8th Langenauer Wasserforum

7th and 8th November 2011
Langenau, Germany

German Symposium and Exhibition
on Water and Environmental Analysis

**“8 Years of development in organic trace analysis
with chromatography and mass spectrometry”**

Information: www.lw-online.de

Thank you very much for your attention!

