

Development of a reference material for emission testing based on lacquer mixtures

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Introduction

Building materials and furniture emit substances that have the potential to harm human health. Those material emissions can be assessed with emission test chambers which are therefore an essential tool for indoor air monitoring.

Actually in this field there is a lack of reference materials for the quality control of the emission test chamber method applied in test laboratories. This study aimed at the preparation and test of a material that constantly emits selected (S)VOC constantly.

Material and Methods

1. Preselection of substances for investigation

- VOC: styrene, N-methyl-2-pyrrolidone (NMP), 2-ethyl-1-hexanol, dimethyl phthalate (DMP)
- SVOC: n-hexadecane and dibutyl phthalate (DBP)

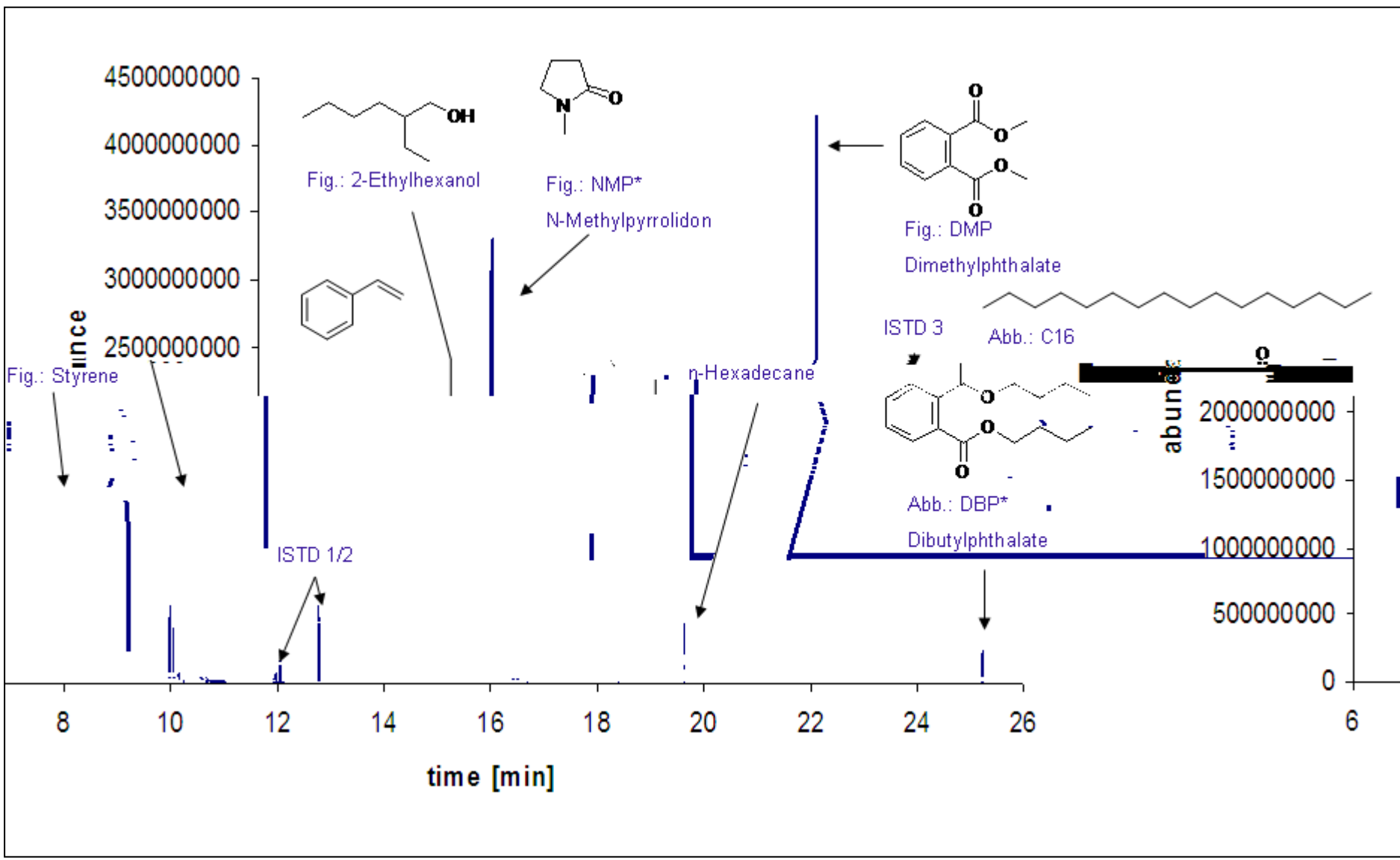
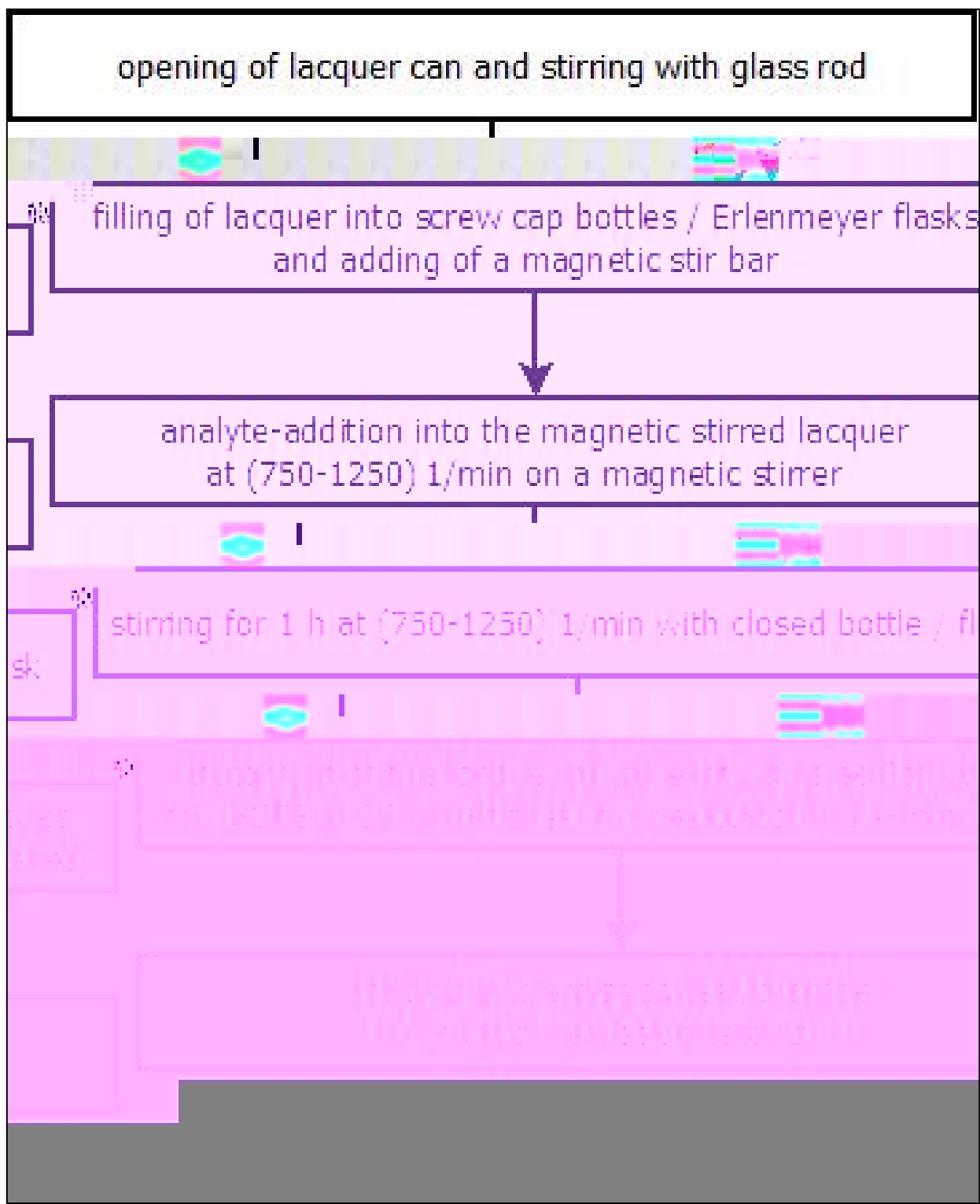


Fig. 1: SIM-chromatogram of the tested substances
(*SVHC – substances of very high concern¹ / ISTD – internal standard)

2. Analysis and sampling

→ Sampling was carried out in accordance to ISO 16000-6 and ISO 16017-1 with TENAX® TA followed by TD-GC/MS analysis (thermal desorption- gas chromatography / mass spectrometry).

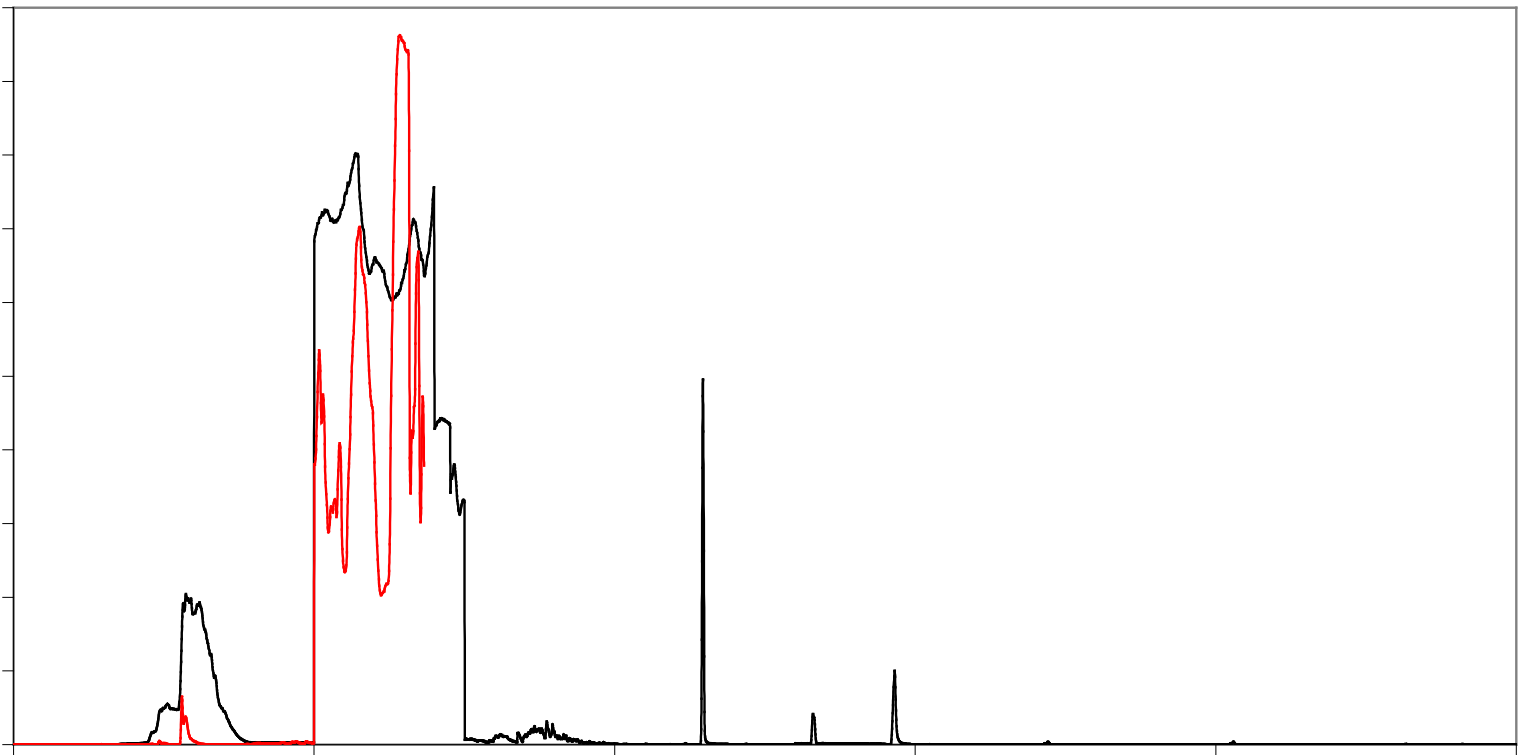
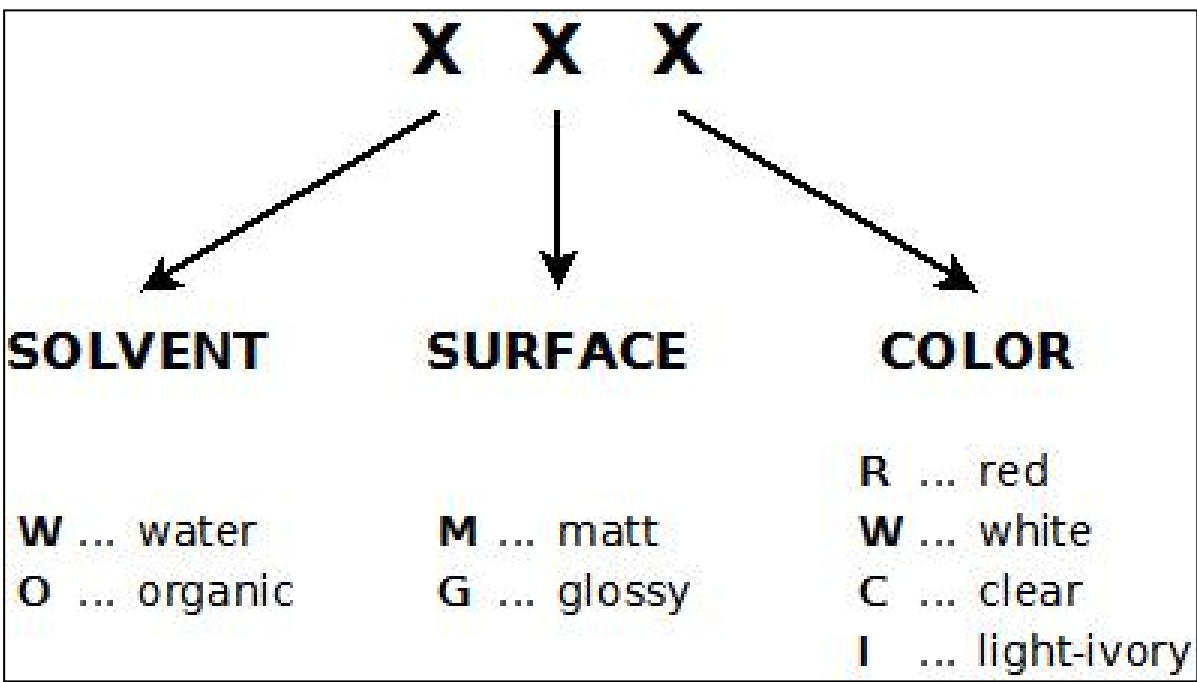
3. Lacquer Preparation



Results

1. Lacquer selection

- 12 standard lacquers selected (made by the same manufacturer)
- 6 of them acrylic based (incorporating water as solvent) and 6 based on alkyd polymers (incorporating organic solvents).



- alkyd lacquers showed high self emission (Fig. 5)
- coloured lacquer with heterogeneous surfaces after curing (Fig. 4)
- WGC as preferred substrate because of high analyte emission, low self emission and homogeneous surface

2. Stability testing

- from one lacquer batch 9 x 20 g were loaded into a 1-m³-chamber for a curing period of 3 days
- eight samples were loaded into eight desiccators (24-l-chamber) and one into a 1-m³-chamber.