Simultaneous sampling and analysis of indoor air infested by *Cimex lectularius* L. (Hemiptera: Cimicidae) with solid phase microextraction, thin film microextraction and needle trap device

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**Results & Discussion**

**INTRODUCTION & THEORY**

Air in a room infested by *Cimex lectularius* L. (Hemiptera: Cimicidae) can be sampled simultaneously by three different sampling devices including solid phase microextraction (SPME), thin film microextraction (TFME) devices, and needle trap devices (NTDs) and then analyzed by gas chromatography-mass spectrometry (GC-MS).

The results presented in the current study illustrate the thermodynamic theory of SPME.

The thermodynamic theory of SPME is based on the following equation:

\[ \Delta G = -RT \ln K_{fs} \]

where:

- \( \Delta G \) is the change in free energy
- \( R \) is the gas constant
- \( T \) is the temperature
- \( K_{fs} \) is the distribution constant of fibre coating/sample matrix

**SPME DEVICES & SAMPLING CONDITIONS**

**Thin Film Microextraction Device (TFME)**

- Sampling method for TFME devices & SPME coatings
- Exaction time 3.5 hr
- Sampling indoor air by providing agitation

**Needle Trap Device (NTD)**

- Sampling method for NTD devices
- Extraction time 20 min
- Sampling indoor air by providing active sampling

**RESULTS & DISCUSSION**

**Performance of TFME Devices**

- TIC chromatogram: Highly infested air sample
- Biomarkers of infestation

**Performance of SPME & NTD Devices**

- TIC chromatogram: Highly infested air sample
- Biomarkers of infestation

**RESULTS & DISCUSSION - CONTINUED**

**Conclusions**

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