**Background**

**What is electronic waste (e-waste)?**
- "All items of electrical and electronic equipment and its parts that have been discarded by its owner as waste without the intent of reuse."  

**Why is e-waste a problem?**
- One of fastest-growing waste-streams  
- Improper management leads to hazardous substances being released

![E-waste](image)

![Contamination risk](image)

**Methods**

**Desorption and Extraction**

**Gas and Particle Sampling**

**Characterization**

**Analysis**

**Results (continued)**

**Environmental Release Particulate matter, VOCs and leachate**

**Results**

**Characterizations and pyrolysis**

**Wavenumber**

**Fourier-transform infrared spectroscopy (FTIR) spectra of circuit board materials.**

- The main peaks for CB at room temperature were at 3386 (Si-O-H), 2927 (C = O, methyl and methylene group), at 1072 (Si-O) and at 800 (C-O, benzene derivative group).

![Wavenumber](image)

**4. Summary**

- TGA results indicated circuit board degradation from 270°C to 538°C, ash content > 70%  
- FTIR spectra shows most of the thermal degradation of the polymer fraction of CB at 300°C.  
- Particle count analysis indicated that during pyrolysis of CBs higher sized (3 and 5 µm) particles were produced, whereas burning of plastic cable cord emitted small sized particles  
- XRF result showed that circuit boards are composed of multiple elements  
- GC-MS and IRIS showed several toxic compounds were present in the emission gases of pyrolyzed circuit board for Toxic characteristic leaching procedure (TCLP) analysis.

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**Objectives**

1. Identify substances contained in fumes from e-waste pyrolysis  
   - Obtain a better understanding of what can be released from burning or incinerating e-waste  

2. Identify metals contained in leachate of e-waste that has undergone the EPA Toxicity Characteristic Leaching Procedure (TCLP)  
   - TCLP models landfill conditions  
   - Better understand what metals can leach out from landfill e-waste  

3. Assess the health risks of the substances detected