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# Chemicals in waste materials and Life Cycle Assessment

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**Chemicals** are inherent part of materials and products. A variety of chemicals is used in different materials (paper, plastics, textiles, etc.), as well as products made of those materials (toilet paper, drinking bottles, denim trousers, etc.). The types and amounts of chemicals vary depending on the material, its processing and its applications.

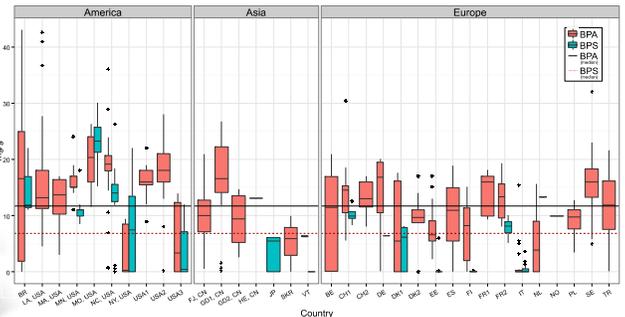
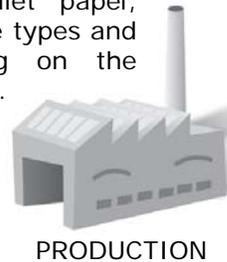
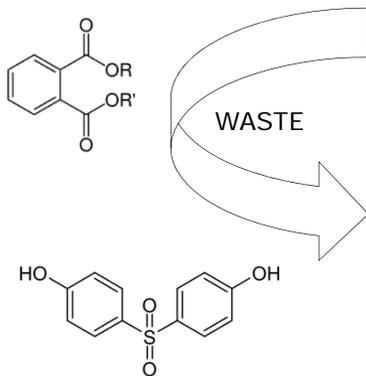


Figure 1. Concentrations of bisphenol A (BPA) and bisphenol S (BPS) in thermal paper from different countries (Pivnenko et al., 2018).



**Life Cycle Assessment (LCA)** is commonly used for assessing and comparing waste management alternatives. LCA methodology takes into account emissions resulting from a variety of processes in a product's lifespan.



**WASTE MANAGEMENT**

**"Emissions"** (evaporation, migration, etc.) of chemicals resulting from the use of recycled materials are not taken into account in LCA. Introduction of an additional chemical load through recycling may lead to an elevated exposure to a chemical.



**RECOVERED MATERIAL**

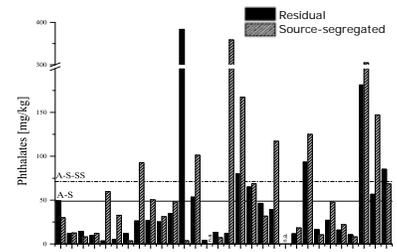
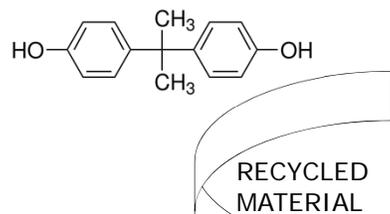
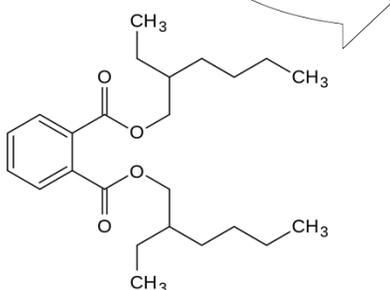


Figure 2. Phthalate concentrations in different waste paper fractions (Pivnenko et al., 2016).



**RECYCLING**

**Risk Assessment (RA)** methodology is used to evaluate an exposure to a chemical. RA is not directly compatible with the LCA methodology, as the two tools answer different questions. When comparing waste management alternatives, possible environmental benefits should be balanced with potential risk of chemical exposure.



**CONSUMPTION**

