

## Properties of PBS

---

### Aroma scalping properties

Showing a medium Hildebrand solubility parameter, PBS can theoretically interact with a lot of organic compounds. As a consequence, PBS is predicted to show a potential of high aroma scalping. Moreover due to a low glass transition, the transfer dynamics are supposed to be fast, with a potential effect of quick losses of food organoleptic properties.

As representatives of different characteristics of aroma components, the following compounds were selected to simulate wide range of physico-chemical properties: ethyl acetate, ethyl butyrate, ethyl caproate, hexan-1-ol, heptanal, R-(+)-limonene. Low density polyethylene was taken as a reference of packaging polymer with high aroma scalping properties

*Aroma scalping:* The permeabilities cohere well with the available literature data (ethyl acetate-LDPE [Polym. Eng. Sci. 23, 1984, 734]). The obtained results show that the PBS-based films have comparable barrier properties, i.e. permeability, as the LDPE film for polar compounds (ethyl acetate, ethyl butyrate, hexan-1-ol). On the contrary, the permeability of the PBS-based films for the less polar compounds (ethyl hexanoate and heptanal) is by one order of magnitude lower than those of the LDPE film. The permeability of the PBS-based films for the non-polar compounds (R-(+)-Limonene) is by two orders of magnitude lower than that of the LDPE film.

To summarize the results obtained by the microgravimetric measurements, the **PBS-based films have comparable barrier properties as LDPE films for polar aroma compounds** (alcohols, esters with short aliphatic chains up to C4) **and significantly better barrier properties for compounds of low polarity** (aldehydes, esters of longer aliphatic chains than C6, hydrocarbons).

*Transfer dynamics:* Overall evaluation of measured results shows different characteristics especially for the group of PBS based materials and PE based foil as a reference material. Depending on the differences of solubility (S) and differences in diffusivity (D) differences can be observed on the resulting permeability (DXS). Some aroma are better lost by BPS materials and others are better lost by polyethylene. For data measured by HS-SPME/GC-TOFMS the significant drop (approx. 50% for 24h) of concentrations of all tested compounds in all packaging materials was observed. Therefore the worse protection to losses of this kind of compounds in spectrum of volatiles during the storage period of packaged food can be assumed.

**However, despite the observed differences, the behaviour of PBS and LDPE films with respect to the model aroma compounds was generally very close. PBS can then be classed at the level of LDPE for its aroma sorption and transfer properties.**