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Biodegradation rate of biodegradable plastics at molecular level

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13 **Abstract**

14 Plastics are solid materials where biodegradation happens on the surface. Only the
15 surface is affected by biodegradation while the inner part should not be readily available
16 for biodegradation. Thus, at a laboratory level, the biodegradation rate is expected to be
17 a function of the surface area of the tested sample. The higher the surface area, the
18 higher the biodegradation rate, all other environmental conditions being equal. In order
19 to further explore the role of particle size on biodegradability, plastic pellets of
20 polybutylene sebacate were milled and sieved into different particle sizes, thus
21 obtaining four samples, pellets included, with different specific surface areas (33, 89,
22 193, and 824 cm²g⁻¹). The surface areas were assessed through direct measurement
23 (pellets) or a theoretical estimation followed by an image analysis. The different
24 samples were tested for biodegradation in soil for 138 days. The rates calculated with a
25 linear regression in the first part of the biodegradation process were related to the
26 respective total available surface area. The data are well described by a linear regression

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