

Mechanochemical (MC) methods have shown an excellent performance while decomposing a number of halogenated persistent organic pollutants (POPs). In this study, a number of MC degradation tests were performed on hexachlorobenzene (HCBz), using an all-dimensional planetary ball mill and applying selected additives, including CaO, CaO-SiO₂, CaO-Al₂O₃, CaO-Al and Fe-SiO₂. After 8 h of milling, up to 99.7% of the original HCBz was removed by processing with a combined CaO-Al additive. Different ratios of Al to CaO were compared and the highest (99.70%) destruction efficiency of HCBz was achieved after 3 h by the additive CaO-Al (11.1% added), considered to be the most practical pair. Sequential dechlorination of HCBz and polymerisation of the resulting residual benzene should be the main degradation pathway; this conclusion is reached by observing lower chlorinated intermediates and graphite and amorphous carbon as final products. Strong radical signals and micro-spheres as well as tribo-microplasma phenomena were induced by severe mechanical ball milling.

