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International Scientific Journal

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EFFECT OF CHAR LAYER ON TRANSIENT THERMAL OXIDATIVE DEGRADATION OF POLYETHYLENE

ABSTRACT

A transient one dimensional model has been presented to simulate degradation and gasification of polyethylene, in early stage of fire growth. In the present model effect of oxygen on degradation and rate of polymer gasification while the sample is subjected to an external radiative heat source is numerically investigated. This model includes different mechanism, which affect the degradation process, such as in depth thermal oxidative decomposition, in depth absorption of radiation, heat transfer, volatiles advection in solid phase and convective heat transfer on surface. Also effects of radiative parameters, due to formation of char layer such as surface reflectivity and absorptivity on thermal degradation of polyethylene are investigated. The results for 40 kW/m² heat source are reported and yielded realistic results, comparing to the published experimental data. The results show that an increase in oxygen concentration leads to considerable increase in gasification rate and also leads to sharp increase of surface temperature.

KEYWORDS

[thermal oxidative degradation](#), [polyethylene](#), [reflectivity](#), [absorptivity](#), [absorption coefficient](#)

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