

The effects of gas phase oxygen on the rate of gasification and surface temperature of PMMA and low density PE samples (4 x 4 cm) were investigated under transient, nonflaming heating by thermal radiation.

Five different ambient gas mixtures, 100 % nitrogen, 5 % O<sub>2</sub>/90 % N<sub>2</sub>, 20 % O<sub>2</sub>/80 % N<sub>2</sub>, och 40 % O<sub>2</sub>/60 % N<sub>2</sub>, were used. The vertically oriented samples were subjected to two different radiant fluxes, 1.7 and 4.0W/cm<sup>2</sup>. For PMMA, large bubbles are formed in the hottest, near-surface layer in a nitrogen environment; these bubbles are smaller and more frequent in oxygen-containing environments. It appears that the molten surface layer of PMMA becomes less viscous in an oxygen-containing environment, and this enhances bubbling mass transfer of in depth decomposition products to the surface; the bubbles in turn affect the depth to which oxygen alters the decomposition process.

The surface of PE turns brown in oxygen containing environments, increasing the local absorption coefficient and hence increasing the rate of heating. An increase in gas phase oxygen concentration increasing the rate of heating. An increase in gas phase oxygen concentration increases the gasification rate of PMMA and PE substantially. With PMMA, when the rate of gasification becomes substantial, the effect of oxygen on the gasification process is reduced; the conterflow of gases from the surface apparently serves to reduce the oxygen supply rate to the condensed phase. An increase in oxygen concentration significantly decreases the surface temperature of PMMA and even more significantly increases that of PE. Neither polymer gasifies like a liquid in the sense of having constant surface temperature and mass flux proportional to energy input.