A multi-zoned flow Model for Silent Discharge Reactors

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The reaction space of the silent, or ozoniser, type of discharge consists of randomly distributed high temperature, high electron concentration zones. These zones are initiated by the high field regions produced around the surface microprojections on the electrodes. The electron density of these zones depends on the power supply to the reactor, but may also be varied by mechanically produced surface irregularities, or by changing the electrical circuitry to influence the pulsing characteristics of the current wave train.

A multi-zoned model has been developed which considers the spatial distribution of the primary and secondary reaction zones throughout the reactor and the paths taken by the gas through these zones. This model has been applied to experimental results on ozone synthesis in the silent discharge and successfully predicts the exit concentration in terms of the flowrate, total discharge current, surface effects and the variations in the current wave train.

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