A Discrete-sectional Model for Particle Growth in Aerosol Reactor: Application to Titania Particles

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A discrete-sectional sintering model was developed to simulate primary particle growth of agglomerates in aerosol reactor. The model was based on a discrete-sectional model (Landgrebe ,1990) modified from the sectional model (Gelbard,1980) for spherical particles. The present model incorporates two sets of differential equations for each section: one for agglomerate volume concentration which is exactly the same as that of Landgrebe (1990) and one for agglomerate surface area concentration which is new in this model. The same collision integrals were used both for volume and surface area concentration which is also new in this model. The effect of agglomerate shape in the coagulation rate is considered by using coagulation equation proposed by Rogak and Flagan (1992) and a constant mass fractal dimension. The model was applied to the synthesis of titania particles from the oxidation of titanium tetrachloride .The model prediction was in good agreement with other existing models.