

Novel kaolinite based coolant for hyperthermal pyrotechnic aerosol cooling

ABSTRACT

Novel spherical pyrotechnic aerosol cooling granulates which are made of 42.8% kaolinite powder, 38.8% water, 8.1% epoxy A&B glue and 10.2% ethyl cellulose are successfully synthesized and can cool down the temperature of hot pyrotechnic aerosol from 1400 to 400 °C below with only a 1:1 mass ratio of coolant to the aerosol forming agent. The cooling system is a packing bed randomly stacked with 5 mm diameter cooling granulates. The kaolinite based cooling granulate has proper yield stress to provide the cooling bed a constant porosity in order to avoid any tunneling effect and granulate structural failure during hot aerosol cooling. Moreover, the synthesis process of current novel kaolinite based granulate coolant is simple and economic. Compared to other coolants like irregular granite gravels or ceramic intalox used for pyrotechnic aerosol cooling, the cooling performance of spherical kaolinite based cooling granulates is superior.

Keyword: Kaolinite; Coolant synthesis; Pyrotechnic aerosol; Packing bed