Study of Electrostatic Charge Generation of Powders During Pneumatic Conveying

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***Abstract*—Generation of electrostatic charge can lead to operational challenges including particle-wall adhesion as well as particle agglomeration and segregation, in some gas-solid processes such as gas-solid fluidized beds. For instance, electrostatic charging has been clearly observed in catalytic gas-solid fluidized bed reactors in polyethylene production plants. In such reactors, bed electrification causes polyethylene and catalyst particles to adhere to the reactor wall, leading to a problem known as "sheeting". This is a major drawback since particle sheets can break off and block the reactor, causing long shut down and maintenance periods, which results in significant economic losses due to decreased production and higher maintenance costs. In addition to catalyst and polyethylene particles being charged inside such reactors due to particle-particle and particle-reactor wall collisions, the catalyst particles can also be highly charged during their pneumatic conveying through narrow tubes. The charged catalyst particles can in turn contribute to the formation of reactor wall fouling upon their entrance into the reactor. Thus, the aim of this work was to investigate electrostatic charging behaviour of powders through pneumatic conveying. Various powders (e.g., fine glass beads) were tested while the effects of conveying tube length and its pathway (addition of bends), as well as the influence of conveying tube inner wall coating were investigated.**