Effect of Temperature on Fluidization Characteristics of Iron Particles in a Gas Fluidized Bed

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Research and development of smelting reduction processes and the direct reduction processes without any pretreatment have been carrying out as an alternative to blast furnace. Since fluidized bed reactor is appropriate one for gaseous reduction of iron ores with many advantages, developing a new iron making process by using a fluidized bed reactor would be an important research topic. In the present study, the minimum fluidization velocity and entrainment rate of iron particles in a gas fluidized bed have been determined with variation of temperature to provide fundamental design data for developing a fluidized bed for iron ore reduction system. The experiments were carried out in a fluidized bed made of stainless steel column (0.11 m-i.d. x 2 m-high) of iron particles with a density of 3.98 g/cm3 and the size range of 0.125 - 4.75 mm at the temperature range of 25 - 800 °C and air velocity up to 1.20 m/s. The minimum fluidization velocity decreases with increasing temperature. However, the entrainment rate decreases initially and it begins to increase with increasing temperature above 200°C.