

PARTICLES SEPARATION BY GRAVITATIONAL OR CENTRIFUGAL ACTION

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The separation of particles by gravitational or centrifugal action is a unitary operation that aims to separate solid materials of different densities. There are several types of equipment that allow this separation, such as those of gravitational force (dust chambers and elutriators) and those of centrifugal force (centrifuges, cyclones and hydrocyclones). In the process of gravitational separation, the heavier particles move downwards, while the lighter ones float or are carried upwards by the fluid. In this context, there are the dust chambers (separation based on the difference between the residence time of a particle present in a gas stream and its fall time in a separation column) and the elutriators (separation based on the difference between the mean velocity of the fluid and the terminal velocity of the particle). In the centrifugal separation process, the particles are driven out of the center and the heavier particles are moved towards the outer regions, while the lighter ones remain close to the center. In this aspect, there are cyclones (separation of particles in a gaseous stream) and hydrocyclones (separation of particles in a liquid stream). The study of the trajectory of a particle is interesting when the goal is the separation of particles (by differences of size and density). Because of that, the particles are individually characterized by the parameters: specific mass, diameter and sphericity. The particle separation is essential because, besides avoiding the waste of high-value materials, it also can control the pollution of various types of environments. Therefore, the use of these equipments has great importance for the various industrial sectors, such as air purification in the cement and mining industries.

Keywords: unitary operation; centrifuge, elutriators; cyclones.