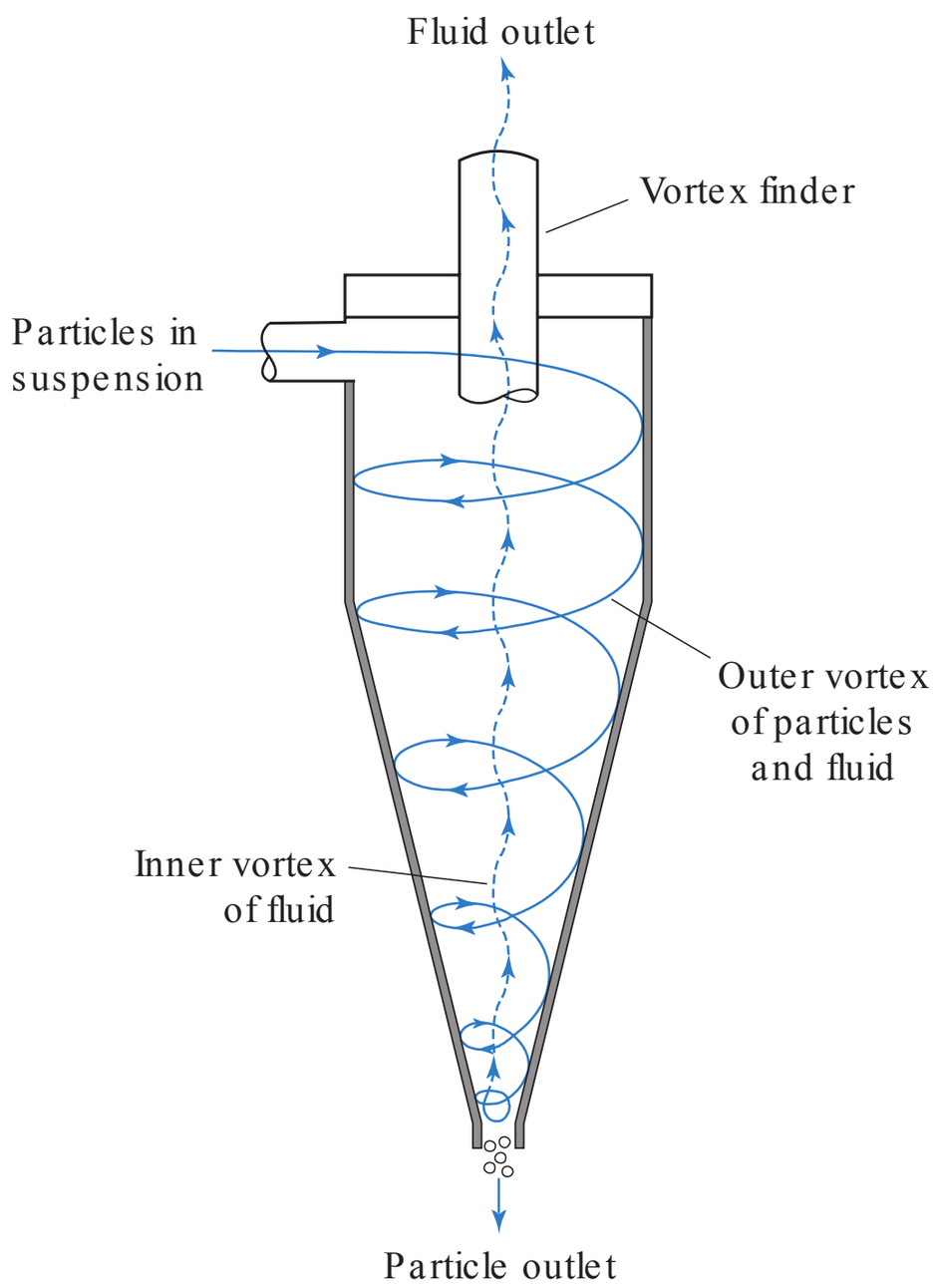

Fig. 10.23 • Reverse-flow cyclone separation.

influence of the fluid flow – gravity interactions are a relatively insignificant mechanism in this process. At the tip of the conical section, the vortex of fluid is above the critical velocity at which it can escape through the narrow outlet and forms an inner vortex which travels back up the cyclone and out through a central outlet or vortex finder. Coarser particles separate from the fluid stream and fall out of the cyclone through the dust outlet, whereas finer particles remain entrained in the fluid stream and leave the cyclone through the vortex finder. In some cases, the outer vortex is allowed to enter a collector connected to the base of the cyclone, but the coarser particles still appear to separate from the fluid stream and remain in the collector. A series of cyclones having different flow rates or different dimensions could be used to separate a powder into different particle size ranges.

Selection of a size separation process

Selection of a specific size separation method may be limited by pharmacopoeial requirements, but for general cases, the most efficient method should be selected based on particle properties. Of these, size is particularly important, as each separation method is most efficient over a particular size range, as indicated in the foregoing text.

Particles that have just undergone size reduction will already be in suspension in a fluid, whether air or water, and can be separated quickly by elutriation or cyclone separation methods, so that oversize material can be returned to the mill.

Alternatively, many powders used pharmaceutically are soluble in water and size separation may have to be restricted to air classification methods.

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