

Spray Drying Apparatus

The atomizer adopts the principle of the ultrasonic vibration. Compared with other types of atomizer, droplets are smaller by ultrasonic atomization. The size of the droplets is directly determines the final state of the solid particles. In general, the smaller droplets, the smaller solid particles.

The drying tower has an internal mezzanine and an external mezzanine. External mezzanine is filled with thermal conductive oil. Thermal conductive oil has a good thermal stability which applied to indirect heat transfer. It has the advantage of uniform heating, accurate temperature control and good heat transfer effect, etc. The maximum heating temperature of the thermal conductive oil can reach up to 300 °C. The internal mezzanine is filled with nitrogen. Nitrogen gas layer mainly played an important role in three aspects. First of all, nitrogen as an inert gas would play a role as protecting gas. Secondly, a high temperature environment was formed by heated nitrogen. The most important of all, under the action of vacuum pump, the nitrogen in drying tower will generate the air flow from bottom to top. The air flow not only can drive the particles directional movement, but also discharge water vapor outside the drying tower timely.

Under the action of vacuum pump, powder would follow with the airflow from bottom to top in the tower. When gas-solid mixtures reach to the collect membrane, gas will pass through the collection of membrane but solid particles will be adsorbed on the collection of membrane. Stay after the spray drying process, solid powder would be acquired from the membrane.

X-Ray Powder Diffraction (XRD) Test

Cl-20 has four kinds of crystal forms, α -Cl-20, β -Cl-20, γ -Cl-20 and ϵ -Cl-20 respectively. ϵ -Cl-20 has the biggest density and the greatest stability among them. HEDC referred in this paper is ϵ -Cl-20. In order to explore the crystal forms of Cl-20 whether changed in spray drying process, crystal forms of raw Cl-20 and microspheric Cl-20 determined by XRD method. The result is showed in fig 1.

In fig 1, XRD powder diffraction pattern presented in the range of $2\theta=5^\circ$ to 60° to provide a clear view of each sample. The strongest peaks of both raw Cl-20 and microspheric Cl-20 appear at similar degrees of 2θ , which indicates that the crystal forms of raw Cl-20 and microspheric Cl-20 are the same. But the intensity of microspheric Cl-20 strongest peaks are weaker than raw Cl-20 such as the peak at 12.2° (2θ) in fig 5, which may because of the smaller crystal size and the more spherical shape of microspheric Cl-20.

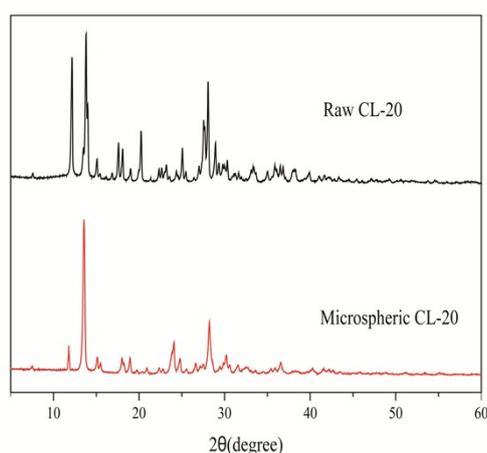


FIG. 1. XRD Powder Diffractograms: Microspheric CL-20 and Raw CL-20