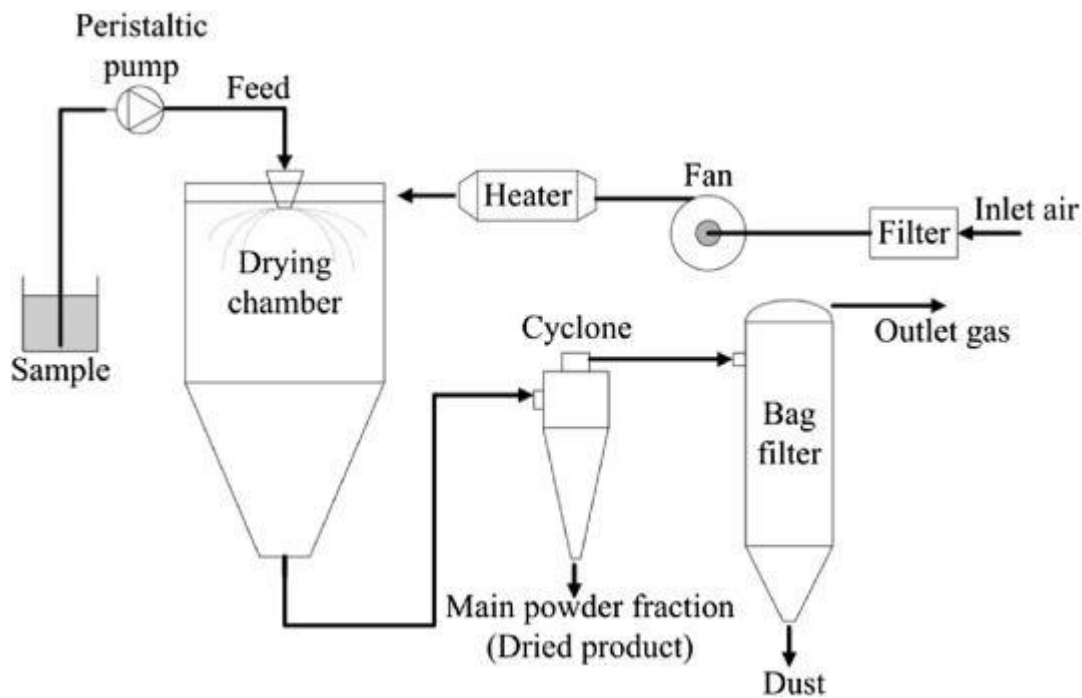


SPRAY DRYER

A spray dryer takes a liquid stream and separates the solute or suspension as a solid and the solvent into a vapour. The solid is usually collected in a drum or cyclone. The liquid input stream is sprayed through a nozzle into a hot vapour stream and vaporized.

In spray dryer, the fluid to be dried is atomized into fine droplets, which are thrown radially into a moving stream of hot gas. The temperature of the droplets is immediately increased and fine drop-lets get dried instantaneously in the form of spherical particles.



PIC-SCHEMETIC DIAGRAM OF SPRAY DRYER

WORKING PRINCIPLE: Spray drying is a one-step continuous unit operation that employs liquid atomization to produce droplets that are dried to individual particles when moved in a hot gaseous drying medium. A spray dryer consists of a feed pump, atomizer, air heater, air dispenser, drying chamber and systems for exhaust air cleaning and powder recovery/separator. The three stages that occur in a spray dryer before drying is accomplished include:

1. Atomization
2. Spray-air mixing and moisture evaporation.
3. Dry product separation from the exit air.

The nature of the final product obtained after drying in a spray dryer depends on;

- The design and operation of the spray dryer.
- The physicochemical properties of the feed.

ADVANTAGES OF SPRAY DRYERS

1. Product quality and properties can be effectively controlled and maintained through the entire drying operation.
2. Thermolabile products/pharmaceutical can be dried at atmospheric pressure and low temperature.

3. Spray dryer permits high- tonnage production in continuous operation adaptable to conventional PLC control (Programmable Logic Controller) and it is relatively simple to operate.
4. Feedstock in solution, slurry, emulsion, paste and melt form can be dried if pumpable.
5. Corrosion problem is minimal and the selection of materials of construction of spray dryer is simplified since the dried material comes in contact with the equipment surfaces in an anhydrous condition.
6. Spray dryer produces dry powder particle of controllable particle size, shape, form, moisture content and other specific properties irrespective of dryer capacity and heat sensitivity.
7. Spray dryer handles a wide range of production rate and provides extensive flexibility in its design that is product specification are readily met through the selection of appropriate spray dryer design and its operation from a wide range of available design.
8. It is an energy-intensive equipment because;
 - a. Specific heat of evaporation can be supplied in a short time.
 - b. The temperature difference across the drying chamber is relatively small and
 - c. An appreciable amount of heat is lost with exhaust air.

DISADVANTAGES OF SPRAY DRYERS

1. Spray dryer is bulky and also expensive to install.
2. It is difficult to clean after use.
3. It has a low thermal efficiency that is a lot of heat is wasted during operation.
4. Solid materials cannot be dried using spray dryers.
5. Product degradation or fire hazard may result from product deposit on the drying chamber.