

SPRAY DRYER

The process involving conversion of fluid into fine droplets and exposing them to a hot drying media, so as to achieve defined dry particulate matter is Spray Drying. It is a widely used continuous industrial process which involves particle formation from feed fluid which may be in the form of solution, emulsion or pumpable suspension into either dry powder or granules. Spray drying involves the following steps .

ATOMIZATION

Conversion of the feed into fine droplets is achieved by either pumping the feed under high pressure through an orifice or by spraying through a high speed rotating perforated disc. The former is known as Nozzle Atomization and is popularly used to produce coarse droplets resulting in large granular particles of dried product. The later is known as Rotary Disc Atomization and produces fine droplets resulting in fine powder particles of dried product.

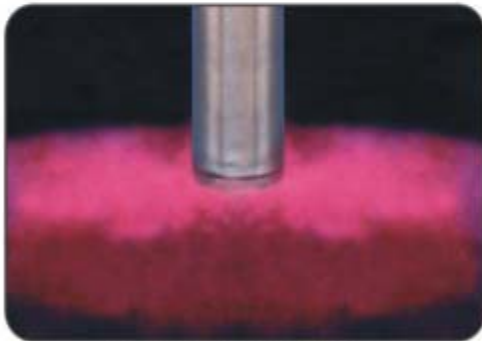
HOT AIR MIXING

Air which is normally the drying media used, is heated to a predefined temperature depending upon the characteristics of the feed fluid and dried product by either an Indirect Hot Air Generator or a Direct Hot Air Generator. This hot air brought in contact with the spray droplets in one of the following ways through the Air distributor.

Co - current : Air and particles move in the same direction.
Counter current : Air and Particles move in the opposite direction.
Mixed flow : Particles are subjected to co - current and counter - current phases.

The thermal energy of the hot air is used for evaporation and the cooled air pneumatically conveys the dried particles in the system. The contact time of the hot air and the spray droplets is only a few seconds, during which drying is achieved and the air temperature drops instantaneously. The dried particle never reaches the drying air temperature. This enables efficient drying of heat sensitive materials without thermal decomposition.

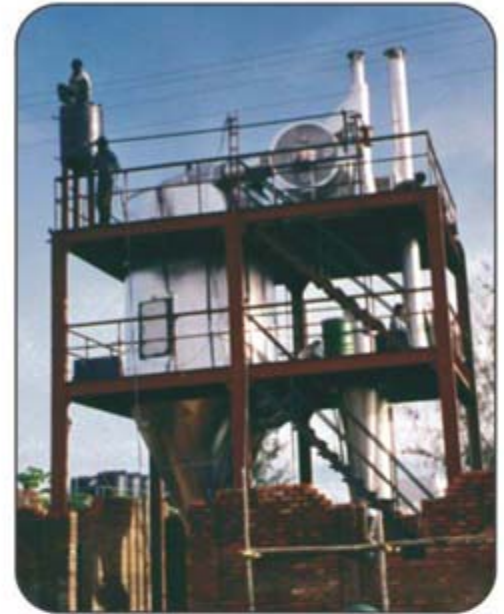
SPRAY PATTERN



ROTARY ATOMIZER



NOZZLE ATOMIZER



SPRAY DRYER- ROTARY ATOMIZER

SPRAY DRYING PILOT PLANT



Spray Drying Pilot Plant facilities available.

POWDER SEPARATION

Dried powder is discharged continuously from the bottom of the drying chamber through rotary valve and the air containing fines is taken to either a cyclone separator or passed through a textile fabric bag filter to recover the fines. The air is further scrubbed in a high efficiency venturi scrubber before being exhausted out to the atmosphere.



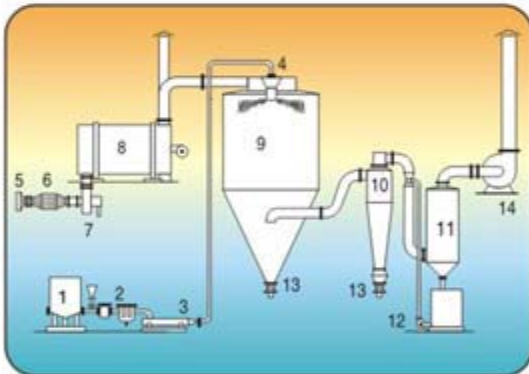
SPRAY DRIER - NOZZLE ATOMIZER

Special powder handling systems are used for industrial applications to either cool the dried powder or to pneumatically convey the same to a product silo. These systems are tailor designed to suit the specific requirements and layouts. Spray drier is an ideal choice as it offers defined end product characteristics in terms of particle size, moisture content, bulk density and particle shape.

SPRAY COOLING SYSTEM

Spray cooling is a process of conversion of molten mass into droplets which is exposed to cold air and thereby solidifying the liquid into defined particle size.

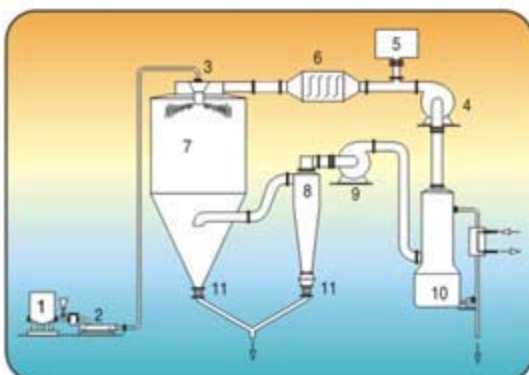
STERILE SPRAY DRYING SYSTEM



These are ideally used for pharmaceutical applications. The system is equipped with special inlet air filters like micro filters, HEPA Filters, etc. and sterile micro filters for feed to prevent any microbial contamination.

1. Feed Tank 2. Micro Filter 3. Feed Pump 4. Atomizer 5. Air Filter 6. Hepa Filter
7. Delivery Fan 8. Hot Air Generator 9. Drying Chamber 10. Cyclone 11. Venturi
Scrubber 12. Scrubber Pump 13. Rotary Valve 14. Exhaust Fan

CLOSED LOOP SPRAY DRYING SYSTEM



These are used for drying the product in solvent base, by spraying the solution or slurries in a nitrogen atmosphere and recovering both the product and the solvent. The drying system can be equipped with fire detection, extinguishing and explosion suppressants. Such systems are ideal for handling solvents, heat sensitive products, prevent oxidation of dried product, and also provide aseptic conditions.

1. Feed Tank 2. Feed Pump 3. Rotary Atomizer 4. Delivery Fan 5. Nitrogen
Recompensator 6. Heat Exchanger 7. Drying Chamber 8. Cyclone 9. Exhaust Fan
10. Scrubber Condenser System 11. Rotary Valve