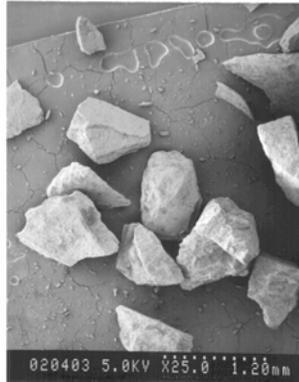


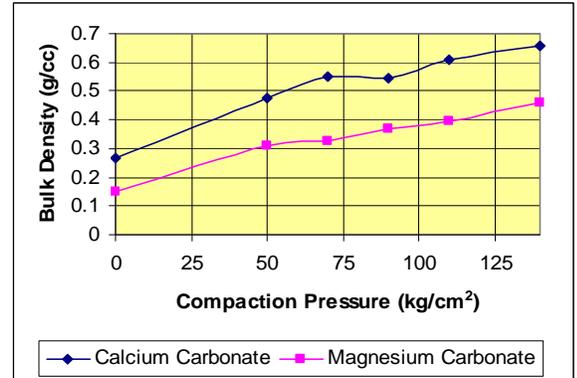
Roll Compaction Granulation



TFC-220 Roll Compaction System



Typical Granule Shape from Roll Compactor



Bulk Density Increases with Compaction Pressure

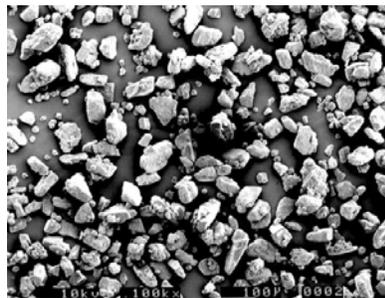
Characteristics of Roll Compaction Granulation

- Produces dense, irregular shaped granule
- Dry granulation – No liquid addition necessary
- Continuous process
- Fines generated by process can be recycled (if required)

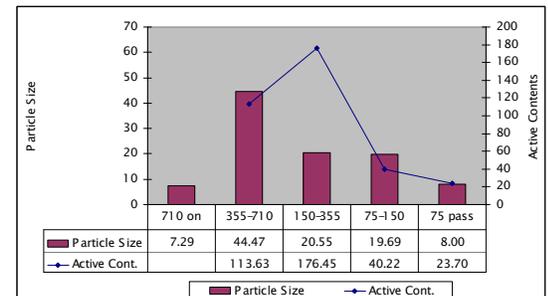
High Shear Granulation



GMX-1200 High Shear Mixer



Typical Granule Distribution from High Shear Granulator



High Shear Granulations typically produce wider distributions compared to other granulation methods.

Characteristics of High Shear Granulation

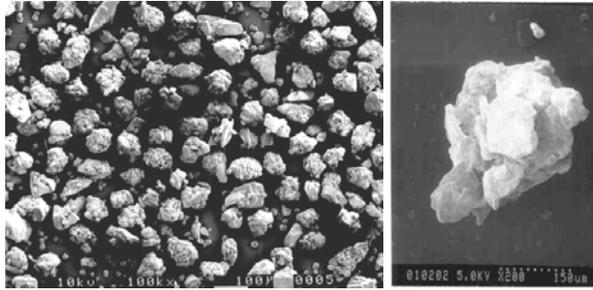
- Produces very dense, irregular shaped granule
- Very fast and simple process
- Requires drying method (ex. fluid bed or vacuum drying)
- Wider particle size variation compared to other methods

Granulation Methods

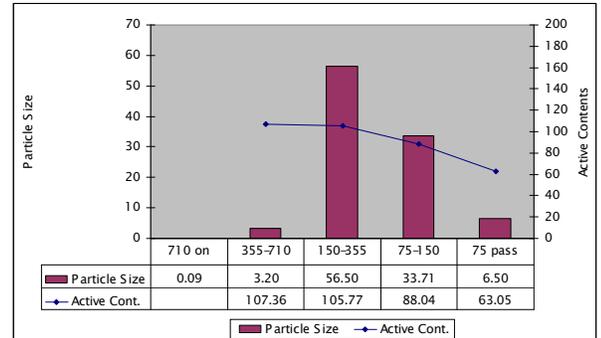
Top Spray Granulation



VFC-500 Top Spray Granulator



Typical Granule Shape and Distribution for Top Spray Granulation



Top Spray Granulations produce a more uniform granule. Active drug is more evenly distributed.

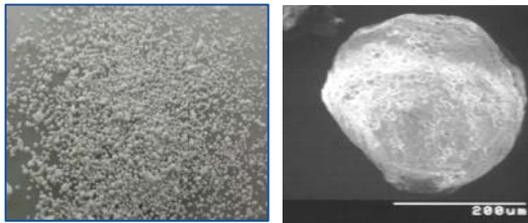
Characteristics of Top Spray Granulation

- Produces less dense, more uniform granule
- Easy set-up, quick changeover between batches
- Rapidly disintegrating granules due to increased surface area
- Multi-functional granulator (also used for Drying and Coating Processes)
- Increased batch volumes (up to 8,400 L)

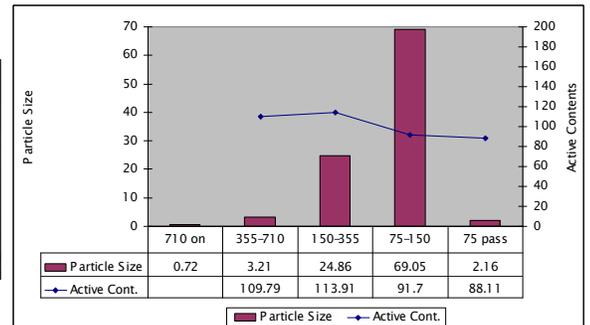
Rotor Granulation (Spheronization)



GXR-35 Granurex
Rotor Granulation Insert
Used with VFC-LAB 3
Flo-Coater System.



Typical Granule Shape and Distribution for Rotor Granulation (Spheronization)



Rotor Granulations produces the most uniform granule. Active drug is most evenly distributed.

Characteristics of Rotor Granulation (Spheronization)

- Produces very dense, spherical granule – for superior flow characteristics
- Most uniform product size and active drug distribution
- Processes are shortened by introducing drying air methods (Granurex)

Providing equipment and processing solutions around the world since 1972, Vector is a subsidiary of Freund Corporation located in Tokyo, Japan. Globally, the Freund/Vector team has thousands of system installations in the pharmaceutical, healthcare, chemical, agricultural, and food industries.