

New Processing Technology for Acid-Base Reactions

Littleford Day Acid-Base Reaction Technology offers a highly efficient and economical means of manufacturing a variety of products and ingredients.

A considerable portion of ingredients in the Food, Pharmaceutical, Nutraceutical and Biotechnical Industries are synthesized from an Acid-Base Reactions. Examples include food products (Dutch chocolate), chemical intermediates (metallic stearates, soaps, etc.), pharmaceutical intermediates (citrates, ascorbates) and other products.

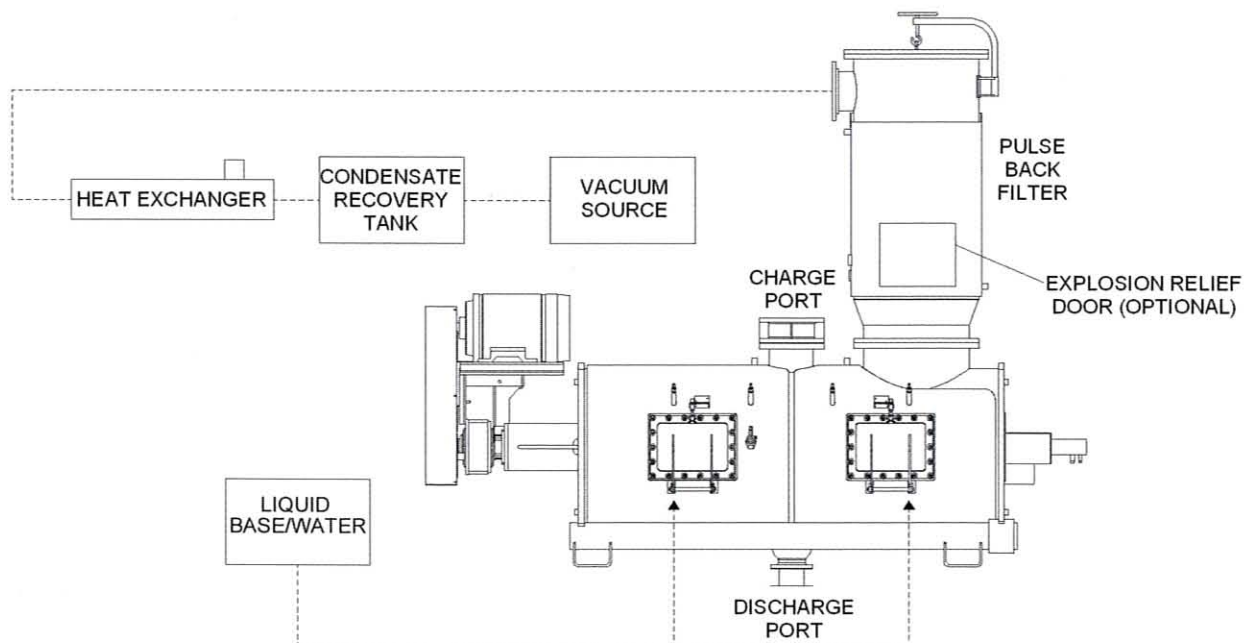
Processors have been searching for an economical way to produce these products. In the past, products have been manufactured in two steps. The first step (the "reaction") has been completed in agitated kettles, ribbon blenders or similar types of equipment. The second step ("drying") has been done in tray dryers, tumble dryers etc. This process is very labor intensive and the cycle times are usually measured in days.

Littleford Day has drawn upon its process technology and advanced Ploughshare® mix action to develop an efficient system for the synthesis of these products.

The Littleford process reacts the acid-base product, then vacuum dries and cools the product all in the same vessel. The Littleford system allows the processor to precisely mix the reagents and accurately control the reaction temperature to produce a fully reacted powdered product of neutral pH.

Typically the Littleford process follows these steps:

1. The acid base material is charged into the Littleford Ploughshare® Reactor/Vacuum Dryer. Agitation (plows and choppers) and jacket heating are initiated.
2. Addition of the water is then carried out by injecting either water or steam depending upon the heat requirements of the process. The excess of water normally required for acid-base reactions is not needed in the Littleford process. The efficiency of the Littleford process is driven by its mix action rather than an excess of water.
3. Once the proper batch temperature is reached, the addition of the base is carried out. Liquid bases are injected into the active chopper field. Solid (powdered) bases are charged into the active mixer via the stack. Addition of the base is carried out over sufficient time to maintain a fast, yet still controlled reaction. The vessel jacket is utilized to maintain the proper reaction temperature either through heating or cooling.
4. After the reaction is completed the excess water is removed by vacuum drying. The drying process is facilitated by use of the high shear choppers to break the drying product from granules into easily dried powder. This dried product is then ready for additional processing, cooling, or discharge.



The Littleford equipment used to accomplish this advanced process is the Littleford Ploughshare® Reactor/Vacuum Dryer. This single unit combines the operational features of atmospheric/vacuum operation with multiple liquid, solid or gas ports, effective heat transfer (heating or cooling) to enable reacting, drying and cooling in a single processing vessel.

The Littleford Ploughshare® Vacuum Dryer operates according to the proven mechanical "fluidized bed" mixing principle. This permits acid-base reagents to achieve intimate, individualized, rapid contact with each other and the heat transfer surfaces.



In addition, the Littleford Ploughshare® Vacuum Dryer may be equipped with independently operated, high shear "chopper" devices to reduce the particle size of the lumps or agglomerates thereby exposing new materials. This ensures that all product is totally reacted. Deagglomeration further shortens the drying time required. The Littleford Ploughshare® Vacuum Dryer has been specifically engineered to maximize heat transfer coefficients, which are many times higher than those of traditional dryers. This advanced heat transfer technology allows fast, single-unit reaction, drying and cooling.

The Littleford Ploughshare® Vacuum Dryer can be enhanced with an optional Littleford Pulse Back Filter to effectively handle the vapor stream created during steam stripping and drying. The Littleford Pulse Back Filter is used to filter the vapor stream as it leaves the Dryer in order to prevent product carry-over into the condenser. The filter is heated slightly higher than the dew point of the vapor, thus preventing condensation. Filter bags of proper porosity are mounted over stainless steel cages and can easily be removed through the top section of the filter housing. A pneumatic pulse jet system provides continuous automatic bag cleaning. Since this pneumatic shock wave clears only one row of bags at a time, there is no interruption of vapor flow through the filter. This provides a smooth continuously operating dust control system for the Vacuum Dryer.

Customers report the advanced Littleford process results in:

1. Controlled reaction and drying through effective/optimum heat transfer.
2. Improved reaction and drying rates.
3. Increased reaction yields.
4. Reduces the risk of cross contamination.
5. Capability of granulating or encapsulating the finished product.
6. Efficient single unit processing of the entire process.

The Littleford Ploughshare® Vacuum Dryer is designed and constructed according to "GMP" and to meet or exceed FDA, 3A, USDA compliance as specified by the customer.

This proven Littleford technology has been applied to numerous complex and difficult applications in the Food, Pharmaceutical, Nutraceutical and Biotechnical Industries. Littleford Ploughshare® Vacuum Dryers can be purchased in a variety of sizes from bench/pilot scale up to larger units to meet most production requirements. Littleford can interface its system controls with existing equipment or supply fully automated process control systems.

For a free brochure or a detailed discussion, contact us at:

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Littleford Day
Where Processing Ideas Become Reality

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