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Ten Things You Should Know When Considering a Tumble Blender

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Whether you are seriously considering a tumble blender for your process or still shopping for a suitable piece of blending equipment, here are 10 basic things you should know and think about before the making final decision.

1. What is a tumble blender? It is a blender equipped with a double-cone or V-shaped rotating vessel. Generally, tumble blenders operate at a speed of 5 to 25 rpm. Diffusion is the main mechanism for mixing: particles are distributed over a freshly exposed surface as the vessel rotates on a horizontal axis. In a V-shaped blender, the batch is continuously being split and recombined.

2. What are the main advantages of the tumble blender design? Tumble blenders are suitable for thorough blending of dense powders, fragile solids, and abrasive materials. They are also commonly used for making precise blends when trace components are present (<1%), or when ingredients are vastly dissimilar in size and density. The geometry of the vessel also allows for fast and complete discharge of the blended material.

3. What are the disadvantages? Tumble blenders require a large footprint to accommodate the mixer base, as well as ample overhead space for the vessel to rotate. Operators must always be careful while running the blender. Also, these blenders are not very versatile when sticky or tacky solids, or paste-like materials are present.

4. Can a tumble blender break up agglomerates? Although a gentle blending device, a tumble blender can be equipped with a high-speed chopper bar to help reduce the size of agglomerates.

5. Can it be used for solid-liquid mixing? Yes, the tumble blenders can be used for mixing low-viscosity slurry-type applications where both liquids and solids are added through the vessel cover. If the liquid phase is a minor ingredient in the blend, it can be continuously sprayed across the solids via spray bar nozzles as the blender is running.

6. What types of blender controls are available? The most basic controls would be for starting, stopping, and jogging the motor. A variable frequency drive may be used for soft-start and to adjust the speed of rotation so that the contents can slide or cascade to the lower portion of the rotating vessel at a controlled rate. If preferred, the blender can be programmed to shut off automatically after a certain number of rpm. Automated controls of the discharge valve are also available.

7. What other factors can contribute to blend quality in a tumble blender?

Filling to the appropriate product level and the method of doing so can affect blend quality. Generally, it is more beneficial to add raw materials in layers rather than side by side. Of course, no matter what type of blender is employed, interactions between particles will affect blend quality. For example, diffusion is restricted by cohesive forces among particles but once these powders are mixed, they tend to remain so. On the other hand, free-flowing powders can de-mix as readily as they mix. Hence, it is important to initially determine optimal blend time by taking samples at timed intervals.

8. Is it possible to arrange a blending trial? Reputable equipment suppliers offer this service. Use your own raw ingredients and simulate conditions as close to your actual process as possible. Another option is to rent a unit on which you can perform unlimited blending trials in the convenience of your own facility.

9. Is the tumble blender right for you? Mixing trials will help you determine this quantitatively. If possible, test other potential candidates such as ribbon blenders and vertical cone screw blenders. You can then compare results of the trials against capital costs, floor space requirements, and cycle time.

10. Important data to discuss with your blender supplier. The most critical parameters will be bulk density of the blended material, major and minor components, preferred material of construction and surface finish, desired working volume, heating and cooling requirements, motor enclosure rating, vacuum and pressure requirements, and type and size of discharge valve.

When in the market for new equipment, one cannot go wrong with good old fashioned planning. The above considerations provide at least a good starting point as you review your processing needs carefully. Work with a trusted manufacturer that offers long-term experience and testing resources.

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