

NIVO ASSIST

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HOT BEVERAGES & GRANULATION

De-mystifying the science of coffee, milk and chocolates, what the terms really mean
Most hot beverage ingredient manufacturers make claims based on granulation, micro granulation, freeze drying and agglomeration.

What do these terms really mean and what's real benefit to the vending industry?

Dehydrated or dry powders have to overcome three major challenges to work in vending machines (and therefore for the operator).

Caking is the process of tightly packed powders, absorbing moisture from the air and sticking together. All dry powders will naturally cake if left open to the air. Caking is accelerated in humid conditions, often peaking in July and August. Caking is the main cause of 'tunneling' whereby the auger in the canister pulls through product it is contact with but the product in the canister does not naturally flow down the canister because it has caked. Caking is especially an issue for products that contain sugars (including natural sugars) such as milk and chocolate.

Dissolution Dissolving dry powders in 2 or 3 seconds is a challenge, especially with premium 12oz drinks carrying high gram throws (e.g. 10g+ of milk or 20g+ of chocolate). Product build up in mixing bowls is caused by 'wetting out' or 'wetting over' of a dry powder, which is when a dry powder becomes superficially wet on the outside but is dry underneath. The water has not been able to permeate the ingredient fast enough to dissolve it and some dry matter is left in the mixing bowl, this builds up causing a blockage.

Faultless Finished Product

Any flecks or part dissolved matter screams out to a consumer 'this is a dirty machine or the ingredients in my drink are off'. Of course this is a disaster and when it happens in an office for example, it is likely the offending cup will be carefully examined and inspected by several people. Faultless finished products, caking and dissolution can only be eliminated with granulation or powder treatments of which there are several processes.

Spray Drying is the most common practice for turning liquids into dry powders, spray drying is NOT hopeful in preventing caking or dissolution, it has no intrinsic benefits to the performance of a powder in a machine. Spray dried products will nearly always suffer some issues with caking and dissolution. Vending ingredients should be (but not all are) spray dried at LOW temperatures otherwise the heat process damages the flavour and can introduce a UHT taste, and a chalky texture.

Addition of inert compounds or agents

Economy products tend to have anti-caking and flow agents added. These are inert substance which attempt to inhibit caking, but they are not always effective and the blend is often not homogenous (so some bags work better than others). Furthermore these agents do nothing to improve dissolution.

Micro-granulation

Micro granules have been a buzzword in vending recently and it certainly sounds good doesn't it? But don't be blown away by the jargon, micro granulation is the lowest form of granulation and is just one step up on spray drying. Micro granulation is often just a second pass through the spray drier, it forms dust and fines into a part baked granule. Micro granulation is sometimes known as instantiation. Micro granules have a slightly larger surface area than spray dried powders and the process increase the porosity of the powders. This helps a little in dissolution and caking, but fundamentally micro granules are not particularly easy to dissolve and will cause issues in none whipped drinks e.g. tea.

Agglomeration or Granulation

Agglomeration can be undertaken using a rapid continuous agglomeration procedure (single pass taking 5-10 minutes) or a batch agglomeration procedure which is more expensive and intensive (taking 20-30 minutes). It's relatively easy to tell the difference, often batch agglomerated granules are large & popcorn shaped and continuous agglomerates are smaller, jagged particles. An agglomerated granule such as Milfresh has millions of tiny air pockets inside it which allows water to reach every part of the dry matter and means perfect dissolution occurs even with no whipper in products such as tea. Batch agglomeration is more expensive but it is worth it because it's the most effective and reliable way to prevent caking, tunneling and to ensure perfect dissolution. In simple terms, if an operator wants to ensure the fewest number of call outs, breakdowns or to maximise the achievable number of vends between cleans they should choose agglomerated/ granulated products of this type.

Freeze Drying

Freeze drying was developed as a drying procedure without heat to protect flavours and aromas in especially sensitive foods such as Coffee, Fruits, and Tea. Of course it is most commonly used for coffee. Freeze drying is very expensive because it involves a concentration process, temperatures as low as -47°C and vacuum treatments. The scientific process, of sublimation involves ice being vapourised in a vacuum. The freeze dried particle has very little remaining moisture (typically 2%). Rather than a popcorn shaped granule full of holes, the freeze dried chip is compact and solid but immediately hydroscopic, it simply melts in water almost instantaneously.

Advice to NIVO members

Like everything in life, in vending ingredients you get what you pay for. Be wary of the buzzwords surrounding granulation. Having a basic understanding of the different processes will help in selecting ingredients that will perform resiliently and consistently.

Often paying a small premium is worthwhile in the overall balance of net cost management (cost of goods and service load combined).