

# The Angels' Share

Distillers and connoisseurs of Scotch Single Malt Whiskies have been aware of this phenomenon for generations: When handling and storing the spirit, a certain part will be lost to evaporation resulting in completely filled casks ending up with significantly reduced filling levels. The missing part is termed the **Angels' Share** which is an accepted consequence as it plays its important role in creating the unique and subtle experience of the matured final product.

Adhesives and sealants certainly follow a less romantic manufacturing scheme but do however experience a similar effect. When exposing formulations containing volatile ingredients to parameters of temperature, pressure and time, will also lose part of the initial composition which needs to be considered in process and formula design. The most relevant phase here is the mixing under vacuum and the dosing of the products. The later storage process is less critical as we certainly do not recommend a storage in wooden casks.

## Handling recommendations

1. Add a proportional excess of the volatile ingredient – using a lump-sum of water scavenger is a classical strategy to get a stable product
2. Reduce vacuum strength and duration as far as product quality allows – often 0.1 atm is sufficient to deaerate the product
3. Keep the temperature low - Cooling is often not economic but heat producing dispersions should be kept as short as possible
4. Replace the volatile ingredient by a less volatile product – e. g. use oligomeric Dynasylan® 1146 instead of AMMO
5. Add the volatile ingredient at a late formulation stage
6. Isolate hot process steps into separate procedures – e. g. prepare a filler masterbatch
7. Don't attempt stoichiometric calculations including volatile ingredients – rather rely on empiric optimizations
8. Reduce air contact specifically of freshly mixed, hot product. Always keep drums closed

More detailed advice also in relation to your individual formulation development project is available at your Evonik contact.

List of volatile ingredients in  
Silane-modified polymers, C- and  
A-silicone formulations

Water scavengers as e. g.  
Dynasylan® VTMO

Adhesion promoters as e. g.  
Dynasylan® AMMO

Inhibitors 600, DVS, MVC and other  
alkinol-based inhibitor chemistries

Catalysts 517 and 540

Modifier 715

