ESG Case Study 2

Circular Economy

What are desiccant packs and what is the science used to determine if they are truly reconditioned? Desiccants are used to remove moisture from air in containers, this protects products from mold, mildew, and water damage. They are supplied in several different packaging materials including cotton, Kraft paper, rayon and polyester cloth bags, perforated plastic, polymer films, polymer housings or Tyvek®. The study being performed used Tyvek covered calcium chloride desiccants. The most common types of commercial desiccants are bentonite, calcium chloride, calcium oxide, molecular sieves, and silica gel. Like other components that comprise a package system, desiccants are subject to strict qualification testing as outlined and directed in the USP <670> General Chapter especially as it relates to their Adsorption Capacity.

For those systems where desiccants are incorporated directly into the wall or cap of packaging containers or bound by a carrier material, unincorporated desiccant should be used in the performance of the testing outlined. For desiccants that are loaded with a predetermined moisture content, testing should be performed before the moisture has been loaded or after the desiccant has been regenerated.

Moisture adsorption capacity requires temperature-humidity chambers capable of controlled humidity at 40% ± 5% RH and 80% ± 5% RH at 25 ± 2°. The desiccant sample is stored in the

chamber and weight gain is measured over time until it reaches equilibrium defined as two successive consecutive weighings that do not differ by more than 3 mg/g of substance taken with the second weighing following an additional 3 ± 1 h of storage at the required temperature and humidity conditions. Adsorption capacity is calculated as percentage weight gained over the initial sample weight.

After doing some internal research the sustainability team at JDM, found that the desiccant packets could be refurbished back to a state that removed up to 100% of the moisture from within the packets and an avg of approximately 65%. When placed in a climate chamber for just 12 hours these reconditioned packets were able to absorb up to 85% of their weight in moisture. After weeks of fine tuning the reconstitution process of the calcium chloride desiccants we were able to establish a process that would allow the packs to be restored at scale. Now, instead of these items flowing into the landfill creating millions of metric tons of waste annually they can be reconditioned and redistributed as a part of a planet and cost savings circular economy.

Annual reduction from this one facility is:

Chemical waste by approx. 249 metric tons

Clean water waste by 15264 liters

Plastic waste by 24 metric tons or about 1.2 million water bottles.

Extrapolating these results across there 12 facilities in North America, assuming similar volume between the facilities would be a reduction of:

Chemical waste by approx. 2988 metric tons

Clean water waste by 183168 liters

Plastic waste by 288 metric tons or about 14.4 million water bottles. To put that in perspective if those were laid end to end it would cover 7% of the Earth.

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