Flow Dry Technology®

Sealing, Drying and Protecting Your Products Since 1946

WHY DO I NEED A DESICCANT IN MY PRODUCT?

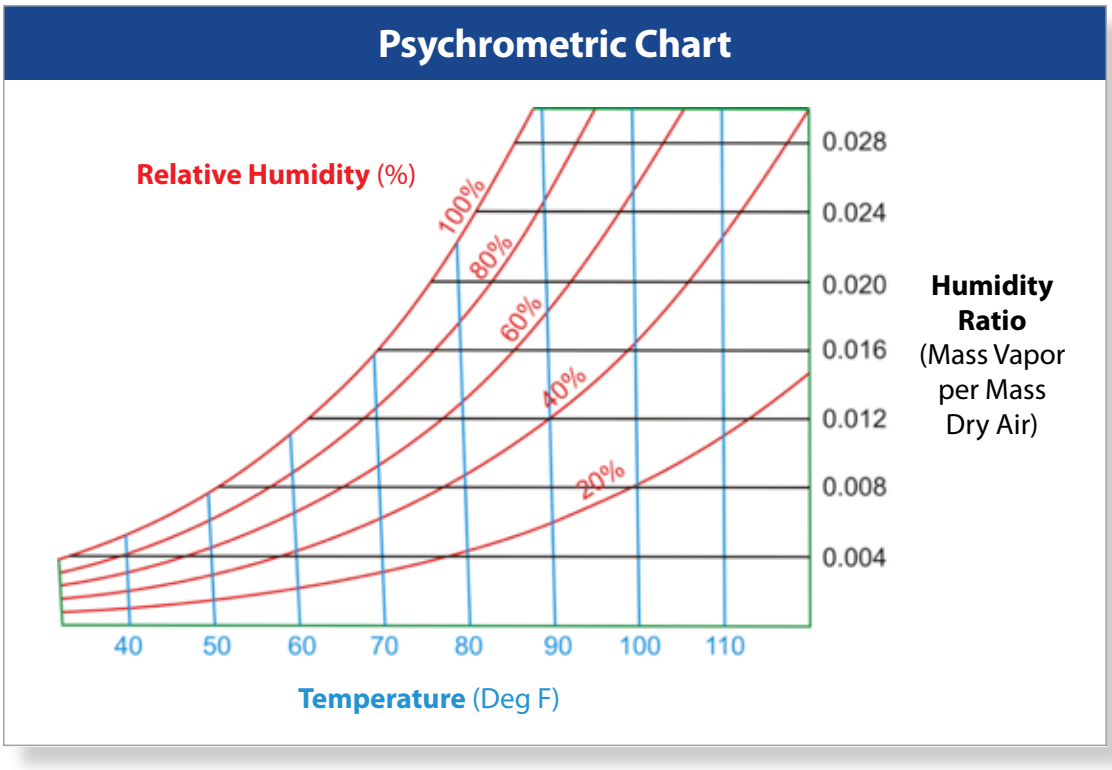
In our previous eNewsletter, we explored the different options for desiccants. This assumed that desiccants were needed. Download the previous eNewsletter

In this edition, we will explain the two main concepts that make desiccants necessary and lay the groundwork for understanding how much moisture adsorbing capacity is necessary.

THERE ARE TWO REASONS WHY A DESICCANT IS NECESSARY FOR MANY PRODUCTS IN TRANSIT AND STORAGE.

First Reason

There is water vapor in the air. This can become a problem because air at a certain temperature and pressure can only hold so much water vapor. If that air is cooled sufficiently, the water vapor will condense. The graphical representation of the relationship between water vapor and air with respect to temperature is known as a **Psychrometric Chart** (shown below).



The x axis shows the temperature and the y axis shows the amount of water in the air. The relative humidity at various temperatures is shown through the red curves, with the left-most red curve being 100% humidity - the point where condensation occurs. For example, if a container of air is sealed at a given temperature - say 90°F and 40% relative humidity - and this air is cooled to 64F, it will condense inside the enclosure. The desiccant helps remove some of the water vapor that is sealed into the container, avoiding condensation. This is a necessity for various containers, from a small diagnostic test kit and also for an ocean-going container.

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Second Reason

While plastics do an excellent job of keeping out liquid water, these materials are all permeable to water vapor. The vapor molecules diffuse through the micro-structure of the plastic, penetrating the interior of the packaging. Below is a table of permeation rates for a variety of polymers.

MOISTURE VAPOR TRANSMISSION RATES

Compound	Vapor (g 25µ/m2/24h)
Polyvinylidene Dichloride (Saran)	0.9 - 3.4
Biaxial Oriented Polypropylene (PP)	5.9
HD-Polyethylene	5.9
Polypropylene (PP)	10.7
LD Polyethylene (LDPE)	17.7
Biaxial oriented PET	18.6
Poly (ethylene terephthalate) (PET)	20.2
Ethylene-Vinyl Alcohol (EVAL G - L)	22 - 124
Rigid Polyvinyl Chloride (PVC)	46.5
Polystyrene (PS)	132
Biaxially Oriented Nylon 6 (PA6)	158
Polycarbonate (PC)	170.5
At 40C and 90% RH	

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Water vapor flows from an area of higher concentration to lower concentration by diffusing through the material. This can be problematic if a product is exposed to humid environments over a period of time, especially if there are also temperature fluctuations that can cause condensation. For example, a one mil (.001") thick film of PET that is one meter square in area will let 20.2g of water permeate through it per day at 40C (104F) and 95% RH. The same size sheet of polycarbonate will let in 170 grams of water per day.

Sizing the desiccant requires understanding how much moisture starts inside the enclosure; plus, the rate of ingress over the time of the expected shelf life. The ingress rate is based upon materials of construction, design of the enclosure, as well as storage and transport conditions. The engineers at Flow Dry can help you determine the proper size of the desiccant based upon calculation or empirical studies.

Moisture can be the determining factor in the shelf life and quality of your product and packaging. And while the moisture enters your product enclosure over time, controlling this moisture and preventing condensation in storage is the main job of the desiccant. Flow Dry can help determine the size and type of the desiccant, minimizing the threat of product damage.

For more information, call **1-800-533-0077** or visit **flowdry.com**

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Flow Dry Technology Inc.
379 Albert Rd.
P.O. Box 190
Brookville, OH 45309
Phone: +1 (937) 833-2161 Ext. 312
Toll Free: +1 (800) 533-0077 Ext. 312
Fax: +1 (937) 833-3208
service@flowdry.com

Flow Dry Kft.
H-2900 Komárom
Lovarda tér 4.
Hungary
Phone: +36-34-542-957 Ext. 32
Fax: +36-34-542-958
service@flowdry.com

Flow Dry (Zhangjiagang) Packaging Products Co., Ltd
Yong Qing Road
Feng Huang Village
Feng Huang Town
Zhangjiagang Jiangsu Province,
China 215613
Zhangjiagang Phone: +86-512-5840-527
Shanghai Phone: +86-21-5918-4372
service@flowdry.com