

Facts and Information about Indicating Desiccant

The most commonly used desiccant is silica gel which is a form of silica or Silicon Dioxide (SiO_2). This is the same material found in quartz sand. The gel form contains millions of tiny pores with an enormous surface area that can adsorb and hold moisture. Silica gel can adsorb up to a maximum of 40 percent of its weight in moisture and does not swell in size as it adsorbs moisture.

As a result it can reduce the relative humidity (RH) in a closed container down to below 40% RH at any temperature in its range until it is saturated.

It will work from below freezing to past the boiling point of water, but performs best at room temperatures (70-90°F / 16-32°C) and high humidity (60-90%). Its performance begins to drop off over 100°F / 38°C but will continue to work until approximately 220°F / 104°C. As the RH becomes lower the capacity of the desiccant to absorb water becomes less also. (See Figure 1)

Bulk desiccant (#19960 & #19961). Our form of bulk silica gel is the indicating type of silica gel. This has a built-in color indicator, bright blue crystals of cobalt chloride, a heavy metal salt, which act as a moisture indicator. As the silica gel begins to adsorb moisture from the air, the cobalt chloride crystals will indicate this by turning light blue and then pink when the gel has absorbed approximately 8% of its weight in moisture. This gives an easy visual indicator of when the gel has started to become saturated with moisture. This is well below the 35-40% moisture saturation point so there is still capacity just like the non-indicating type. Once it has gone past the 8% level and the crystals have turned pink there is no way to tell how close it is to saturation.

This isn't necessarily a problem. You can just change it at that point or you'll treat it like the other non-indicating desiccants and weigh it to determine adsorption. When the silica gel has absorbed up to 40% of its own weight in moisture, it will no longer be effective in removing moisture. At this point, the cobalt chloride crystals will indicate this state of super saturation by turning white. The silica gel must then be reactivated before it can be successfully used again.

Because cobalt is a heavy metal, indicating silica gel is not food safe and should be kept away from and avoid spilling into anything edible.

Once saturated, the moisture can be driven off the silica gel by heating it at 300°F / 150°C in a convection oven for approximately three hours or until the crystals turn blue so they can be re-used again. If the desiccant is packaged in Tyvek, do not heat it above 250°F / 121°C or you could damage the material. Spread the packets so they are not touching and keep them at least 16 inches from any heating elements or flames so that radiant heat does not damage the packaging.

Dehydrating the desiccant may also be accomplished by heating in a microwave oven. Using a 900 watt oven heat the crystals for three minute intervals until the color change occurs. The exact amount of time necessary will depend upon the oven wattage. Spreading the desiccant in a broad microwave safe pan in a shallow layer will speed the process. Heating to 325°F / 149°C or more, or using a microwave oven over 900 watts can damage the gel and render it unable to adsorb moisture. Packaged desiccants e.g. DRICAP®, DriCan or Tyvek should not be microwaved.

DRICAP® Capsule Dehydrators (#19953 & #19956) are considered one time use and are not designed to be reactivated but they can be if you use a temperature high enough to drive off the water but low enough not to deform the plastic capsule. They will not begin to desorb below 104°C. We've used 110°C for one hour minimum in an air convection oven with good results. However, some deformation can occur and can mount up to a loss of 5-10% of the DRICAP® capsules per heating cycle.

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Microscopy Products for Science and Industry

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After activation desiccants should be stored in a sealed impermeable container. DRICAP® Capsule Dehydrators are packed in a resealable foil barrier bag so they have a 1 year shelf life and you can remove a few for use without jeopardizing the remainder as long as the bag is resealed properly.

DriCan Dehydrator (#19950) also contains the indicating silica gel and can be recycled by heating in a convection oven at 300°F / 150°C.

Cartridge Desiccant (#2240-3, #2244-3 & 2246-3) also contains the indicating silica gel and can be recycled by heating in a convection oven at 300°F / 150°C.

Percent Moisture Absorbed Vs RH at 25°C

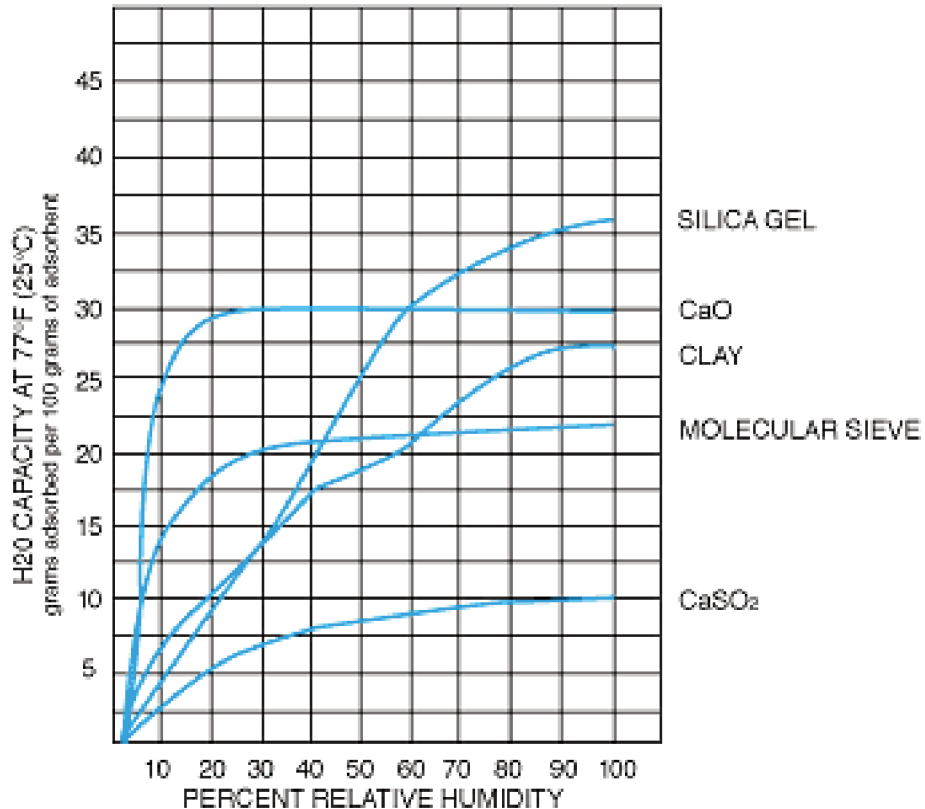


Figure 1

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