GRAIN STORAGE

When Sorbitol powder is melted, then allowed to cool, it does not harden immediately. Rather, it forms a transparent mass that is soft and may be cut with a knife. If pulled, it stretches in the form of long strands. After two or three days, the surface hardens, but the inside remains soft. After 5 days, the mass completely hardens and attains a brittle nature. Interestingly, the material in this "cured" state is non-hygroscopic, at least at moderate humidity levels. Sorbitol-based propellant seems to cure sooner, requiring only one or two days to completely harden.

For maximum performance, the sorbitol should be desiccated to remove all traces of residual water. This is done by placing sifted sorbitol in a shallow pan and putting in a desiccator for several days. A desiccator can be as simple as a Tupperware container lined with a few centimeters of fresh calcium chloride. It is important to note that desiccating should only be done if performance must be maximized. One drawback to desiccating the sorbitol is that it makes for a stiffer, more viscous propellant slurry when melted, making the casting operation more difficult

CALCIUM CHLORIDE VS SILICA GEL

- Calcium Chloride as a desiccant can absorb moisture **faster than** silica gel, making it an excellent choice for quick-drying requirements.
  - Calcium chloride can be mixed with polymer gelling agents and used as container desiccants as a packaging solution.
  - Calcium chloride is a hygroscopic salt that attracts water molecules through hygroscopy. When exposed to moist air, the desiccant absorbs water molecules through a physical process that involves dissolving the salt in the water it has attracted. **This process is exothermic, which means that it releases heat.**
- Calcium chloride has a **higher** absorption rate. Under 25°C and 70% relative humidity, calcium chloride absorbs seven times more moisture than silica gel.
- Silica gel works better in low-humidity conditions, making it a better option for long-term moisture control and smaller packaging. It retains the moisture inside, then releases it back into the air when heated to temperatures of around 120°C to be used again.
- Silica gel is generally more expensive than calcium chloride but more effective in certain applications.
  - Silica gel is used in moisture-sensitive equipment, where small amounts of moisture can cause significant damage. Calcium chloride is often used in large-

scale moisture control applications, such as industrial settings or construction sites

- Both silica gel and calcium chloride desiccant can be reused multiple times, which can help reduce their overall cost. Silica gel can be regenerated by heating it to a specific temperature, which drives off the moisture and restores its adsorption capabilities. Calcium chloride can be reused by dissolving it in water and then boiling off the water to recover the salt.
- Both silica gel and calcium chloride are generally safe to use but pose some risks
  - Silica gel can be harmful if ingested or inhaled;
  - Calcium chloride can irritate the skin and eyes and release toxic fumes if exposed to high temperatures.

REFERENCES

Silica Gel vs Calcium Chloride l Desiccant Performance and Uses (streampeak.com.sg)

http://www.nakka-rocketry.net/sorb.html#Preparation