

Cold Storage of Unstable Materials

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In previous Hacks, I discussed considerations in choosing a freezer and using freezers for pest control. In this Hack, we'll discuss the use of freezers for the storage of artifacts made from unstable materials such as rubber or plastic.

You may have noticed some of your natural or synthetic rubber and plastic artifacts becoming stiff or powdery, or crumbling, or developing a crusty or mottled surface. This is usually due to the degradation of chemicals such as plasticizers, fillers and stabilizers. Sometimes accretions form on the surface (doll disease) and sometimes by-products produced during off-gassing begin to affect other artifacts nearby (vinegar syndrome). These processes are accelerated through reactions with moisture and/or heat. A cold environment can slow down both the rate of deterioration and the off-gassing, in natural or synthetic rubber and plastics.

Organic artifacts affected by mould can also be stored indefinitely in a freezer, pending a decision on whether to clean or discard the artifact, with the exception of paintings and artifacts made of glass. Remember to wear gloves and an N-95 mask when handling mouldy artifacts, and to clean the area where they were stored. Full instructions for dealing with mould-affected artifacts can be found in CCI Technical Bulletin 26- [Mould Prevention and Collection Recovery: Guidelines for Heritage Collections](https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/technical-bulletins/mould-prevention-collection-recovery.html)
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Cold storage can make artifacts brittle and easily broken, and artifacts need to be supported and protected, and handled carefully. Clear plastic Rubbermaid-style storage tubs can be used for artifacts, and archival storage boxes for film and negatives. Before being placed in the freezer, smaller boxes can be double-bagged inside Ziploc freezer bags and larger artifacts can be wrapped and sealed in polyethylene sheeting. The bags protect the artifacts from any fluctuations in relative humidity that can occur within the freezer. If ambient relative humidity is high, place a piece of acid-free matboard to absorb moisture within the bag. Humidity cards can be placed between the two Ziploc bags to monitor the relative humidity within the package. These cards can be purchased online at <https://www.carrmclean.ca/standard-humidity-cards.html> . Keep artifacts in the bags for 24 hours after removal from the freezer to protect them from condensation while they return to room temperature. This allows condensation to form on the freezer bag, and not on the artifact.

The free online Canadian Conservation Institute document [Caring for Plastics and Rubbers](https://www.canada.ca/en/conservation-institute/services/preventive-conservation/guidelines-collections/caring-plastics-rubbers.html#a33)
<https://www.canada.ca/en/conservation-institute/services/preventive-conservation/guidelines-collections/caring-plastics-rubbers.html#a33> contains excellent information on the types of materials that will deteriorate, and why. The US National Parks Service has free publications and videos explaining the benefits and procedures for cold storage of roll and sheet film at https://www.nps.gov/museum/coldstorage/html/conclusion8_3.html. (Please cut and paste this link to get to their website.)

If you have any questions or would like more information on identifying or packing artifacts that would benefit from cold storage, please email me at [conservator \(at\) museumsmanitoba \(dot\) com](mailto:conservator@museumsmanitoba.com). I would be happy to provide virtual assistance, and CSP fees are being waived until further notice to help museums recover from COVID.