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REMOVING ODOR FROM BOOKS AND PAPER - AN EXPERIMENT



Spiceland Academy women students demonstrate a chemistry experiment. Cephas M. Huddleston Collection, Indiana Historical Society - Click [here](#) for more information about this image.

The following case study evolved from a collections care training visit to the Yellow Trail Museum, located in Hope, a town in northeastern Bartholomew County. During the visit, Alan Rowe, coordinator of the Local History Partners program at the Indiana Historical Society, met with the volunteers who run the museum to lead a basic collections care training session and discuss their collections care questions and needs. Primary among their concerns were a series of books and a large, bound volume of fire insurance maps that exuded a strong musty smell after being removed from storage. Considering that the books did not display signs of an active mold outbreak, Alan recommended that the group try to remove the musty odor by placing the books in an air tight enclosure with a tray of unscented clay cat litter. The museum's volunteers embraced the idea and developed a unique series of experiments adapted to the size and type of books that used readily available, low-cost materials.

Ramona Duncan-Huse, senior director, conservation at the Indiana Historical Society, reviewed the case study, and explained that clay cat litter uses [zeolite technology](#) to absorb odor. Ramona says of the technology, "Zeolites are referred to as molecular sieves because their porous structure has the ability to absorb (in this case odors)." Ramona further reports that for thicker books, "We have shaken or stirred the litter over several days, and added a small (desk top) fan inside the chamber to circulate the air over the books. It can be tricky, but it looks like they were able to make it work for them. Thicker books may require a much longer exposure period, changing out the litter for fresh, turning pages to expose different sections, etc." Read below for



ONLINE RESOURCES

[Removing Musty Smells From Objects](#)
(American Library Association)

[Stinky Books](#)
(Preservation Department, Iowa State University Library)

[How can I remove the musty smell from old books?](#)
(Northeast Document Conservation Center)



the process followed at the Yellow Trail Museum, in the words of Kim Ray, museum volunteer:

TREATING MUSTY BOOKS AT THE YELLOW TRAIL MUSEUM

Kim Ray, volunteer, [Yellow Trail Museum](#)

When our small, hometown museum recently created a research room, boxes of books from every nook and cranny were brought to the new room, organized and put on shelves. At first, you could almost hear the books taking a big sigh as they were exposed to fresh air for the first time in many years. Not long after the books were shelved, we were faced with a familiar problem — the smell of old, dusty, musty books that have been stored in attics, basements and boxes for long periods of time. The worst odor came from a large volume of bound fire insurance maps that almost made our eyes water if we were anywhere near it. My first thought was to open the volume wide and let it air out, taking care to turn the pages every few days.

Unfortunately, airing the fire insurance maps did not make a difference, so we turned to the Indiana Historical Society for advice. During a collections care training with Alan Rowe from the Local History Services department, we learned that organizations with limited budgets and resources could use unscented clay cat litter and an enclosure to absorb odors. When musty books are placed in an enclosure the unscented clay cat litter will absorb the odor from the books and help to eliminate or reduce the musty smell. We were eager to apply this knowledge to our musty books, and immediately prepared a series of three experiments adapted to the size and kind of books that we were interested in treating.

EXPERIMENTATION

The first experiment used a plastic Sterilite tote with a snap-on lid. We placed approximately two inches of unscented clay cat litter in the bottom of the tote and inserted a rack to elevate the books above the cat litter to allow the air to circulate freely and to keep the books from touching the cat litter. After the books were placed on the rack, the lid was placed securely on the tote.



A plastic tote, a metal rack and unscented clay cat litter create a basic odor removal chamber. Photo courtesy Kim Ray.

The second experiment was very similar to the first, but could treat more books at a time. We placed two dishpans — each holding approximately two inches of unscented clay cat litter — on the bottom of a three-tier wire rack, and then placed books on the shelves. We then pulled a large, clear plastic bag up over the rack and tied it at the top with a twist tie.



The combination of a chrome-plated wire baker's rack and a large plastic bag creates an enclosure that can treat several books at a time. Photo courtesy Kim Ray.

The third experiment incorporated a unique design to accommodate the large volume of bound fire insurance maps, which would not fit in either of the enclosures used for the first two experiments. After looking around the room, we noticed a card table that would cover the maps and serve as a support for a plastic tent that would enclose the bound maps. A plastic Sterilite tote placed underneath the card table served the dual purpose of holding approximately two inches of unscented clay cat litter and a repurposed wire baking rack to support the bound maps. We completed the enclosure by wrapping a sturdy clear plastic sheet around the card table like a tent, with weights placed around the perimeter to hold the plastic sheet in place.



Treating oversized books requires an innovative approach. In this case, a card table provides the support necessary to create an enclosure using a large plastic sheet. Photo courtesy Kim Ray.

Our experiments were designed to help us identify the right combination of variables: what is the ideal enclosure size to use? How much cat litter should we use? How many books per enclosure can we treat at once? Does the degree of odor make a difference in how long the process must run? We started out documenting all of the variables for each enclosure, thinking we might be able to figure out what works best, but soon found that was not necessary.

All three experiments treated books in batches, and each batch was left untouched for a week. At the end of a week, the books were taken out, evaluated for smell, carefully dusted and placed back on research center shelves if deemed to be odor-free. All of our experiments proved to work in this timeframe for the entire bookshelf of books, except one: the large volume of bound fire insurance maps! We ended up treating the volume for a total of four weeks before it was successfully made odor-free.



Air-tight enclosures in three unique configurations are made from readily available materials. Photo courtesy Kim Ray.

CONCLUSIONS

One week balanced all the variables to a successful result, so the specifics are not too concerning. However, we did swap the books out quickly to avoid changing the air within the containers too much. As for the card table experiment, the length of time that it took to work probably had more to do with the size of the enclosure than the size or smell of the bound maps. It is likely that the large volume of air slowed down the ability of the cat litter to absorb the odors being released by the maps. In hindsight, we could have added more cat litter or used a shorter table (creating less air volume) and it might not have taken as long. This was a great learning experience for us – thanks for the tip, Alan!

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