

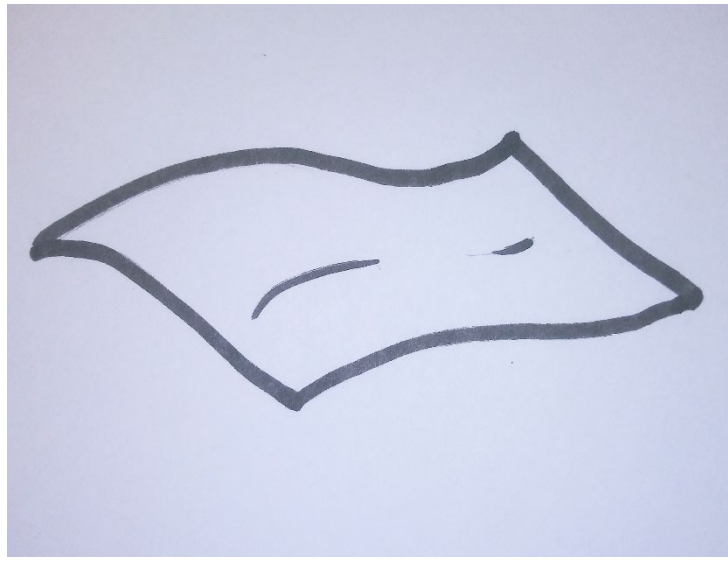
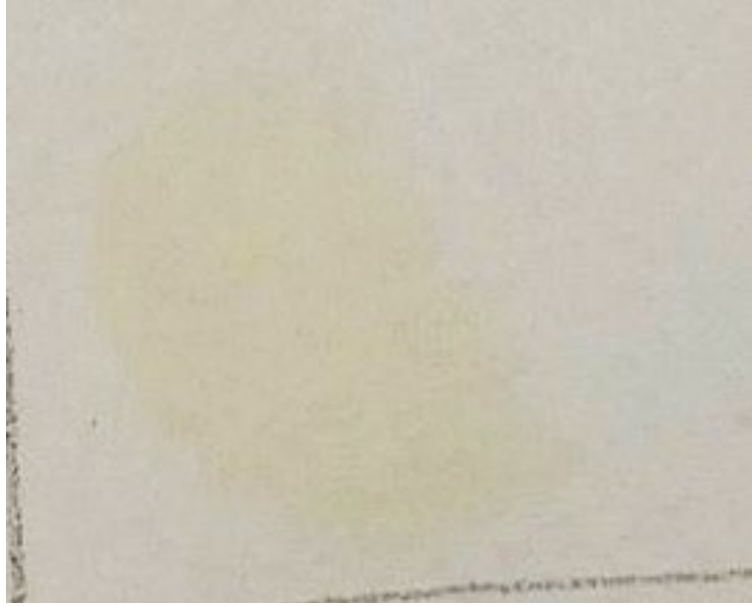
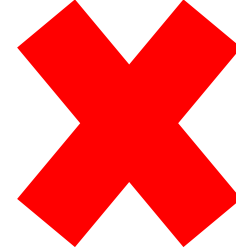

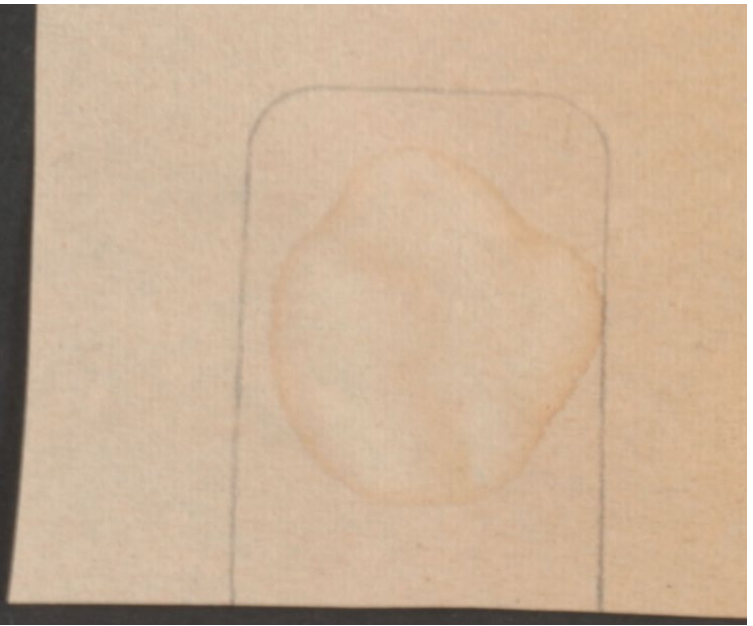

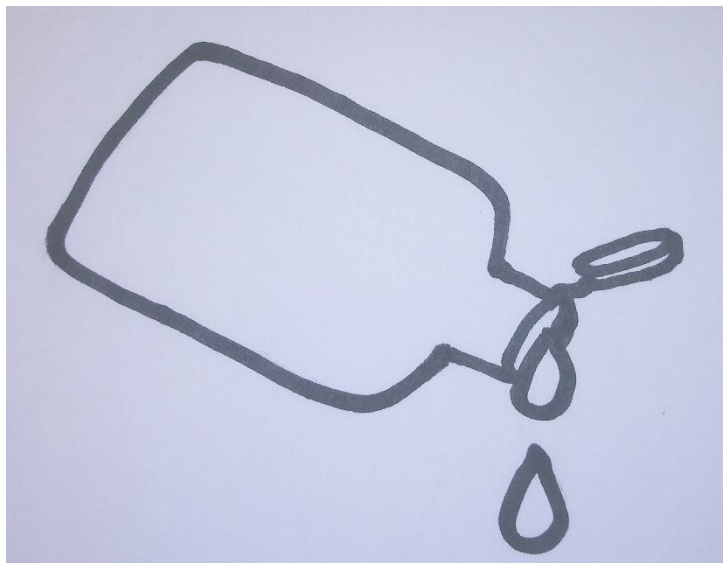
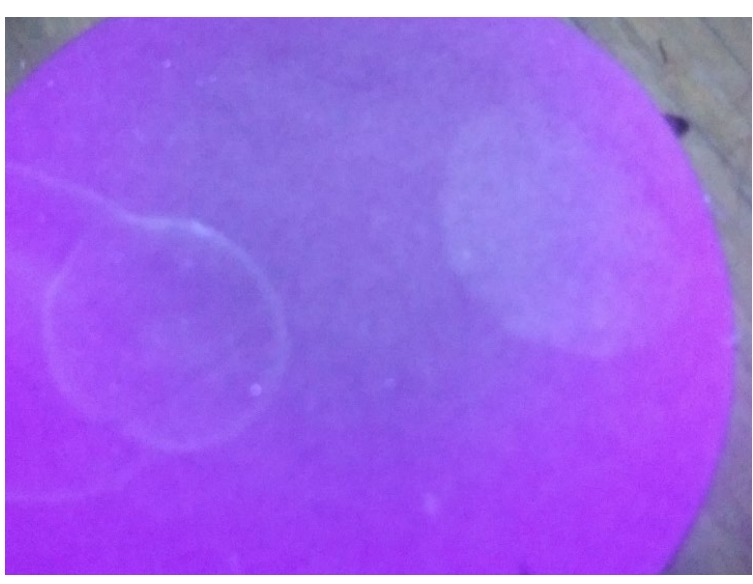


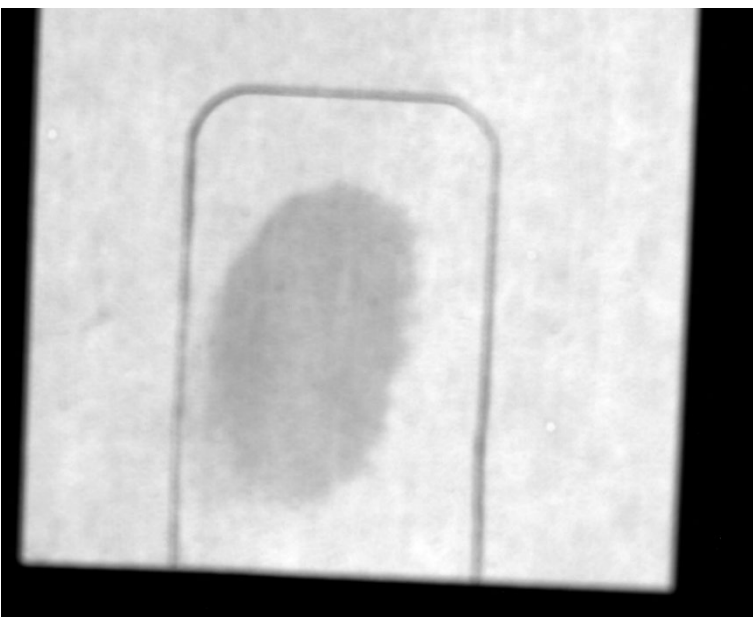



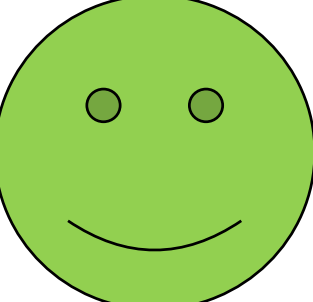
COVID-era Collection Concerns: examining the impact of sanitizer gels and wipes on library and archival materials

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Since the spring of 2020, the use of sanitizing products has greatly expanded in businesses, schools, and cultural heritage institutions alike. Sanitizing sprays, wipes, and hand cleaning solutions are routinely used in expanded cleaning regimens, dispensed for visitor use, and likely lurking in many of our pockets, briefcases, desks and cars. As our institution planned its re-opening to researchers, questions arose about potential transfer of sanitizer residues to collection items during normal handling and use, and what long-term impact they might cause.

Our earlier (2011) study of hand sanitizer gels found that thin films applied to paper all darkened with accelerated aging; water-based gels with quaternary ammonium disinfectants (QAC) generally had less impact than alcohol-based gels, but those are no longer sold due to health risks of skin contact with QAC's. As commercial products change constantly, a fresh market survey of current sanitizer formulations was conducted, and more realistic scenarios of transfer and application investigated.

Typical current commercial and CDC-recommended sanitizers' impacts were applied to eight materials reflecting a cross-section of library and archive general and special collections: book cloth, parchment, leather, and five types of paper. 'Worst case' direct applications and finger transfers after varied drying times were assessed via complementary analyses including UV-light imaging, reflectance colorimetry, multi-spectral imaging (MSI), and direct thermal desorption gas chromatography mass spectrometry (DTD-GCMS). Recommended practices based on these findings are summarized below.

			Wipes containing quaternary ammonia compounds left fluorescent residues that visibly discolored during accelerated aging. These should never be directly applied to paper, leather, parchment or cloth collection items, nor allowed to offset onto them.
			CDC-recommended alcohol-water sprays (70% ethanol or isopropanol) left no fluorescent traces; however, water and alcohol can cause cockling or tidelines on coated papers, book cloths, aged papers, and leather. Preferred over wipes for use on work surfaces, with thorough drying time.
			A wide assortment of sanitizer gels examined all left fluorescent residues from drips and damp finger touches, as seen here under UV light. Accidental drips and direct application should be avoided for all collection materials.
			Sanitizer gel residues also transfer from dryer fingers to the substrates. MSI detected fluorescing marks on 5 of 8 substrates after 15 seconds' drying time and in one case also after "best" drying time. Gel marker compounds were detected by DTD-GCMS on all of the substrates with 15 seconds' drying, and on paper for best-judgement drying time.
			Freshly washed, dry hands had the least impact on the tested substrates, leaving no fluorescent residues and only one case of slight surface marring. For best practices, see: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html

Experimental Methods:

The 2011 study compared 9 water or alcohol based commercial hand sanitizers applied as drawdowns to four paper types. Colorimetry data collected with a HunterLab Ultra Scan Pro 1190, at intervals up to 425 hours' humid oven aging at 90°C, 50% RH.

Sanitizers were applied as direct application ("worst case") and as finger transfers from two team members after 15 second's drying (gel) and after their best judgement of complete drying time (gel and washing). Preliminary tests showed QAC wipe residues can also transfer from fingers, but this variant was not further tested.

Samples were aged in a PGC humid aging chamber at mild conditions of 40°C, 60% RH to avoid thermal damage to the parchment, evaluated at 8 and 16 weeks.

UV-VIS reflectance spectra collected with an ASD FieldSpec FORS spectroradiometer using a contact probe and D65 illuminant. DeltaE-2000 was calculated as each replicate reading's distance from the averaged chromaticity coordinates for the blank control of each substrate.

Multi-spectral images (MSI) were collected with a 39 megapixel monochrome camera combined with 17 illuminated LED light panels between 365-940nm. Data interpretation including false-color rendering and PCA used the Matlab Imaging Toolbox and ENVI spectral processing software.

Volatile compounds were examined via direct thermal desorption gas chromatography mass spectrometry (DTD-GCMS). Small samples (5-15 mg of each treated material) were thermally desorbed for 30 min @ 90 °C under a constant helium gas flow. Desorbed compounds were trapped on a cold inlet held at -150 °C, then separated and detected by GCMS. Peaks were identified via NIST database search and their concentration calculated compared to a toluene standard.



<https://blogs.loc.gov/preservation/2021/06/assessing-the-impact-of-sanitizing-products-on-collection-items/>

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