May 16, 2019
Via Email: *mmcgough@ncspa.org*

Mr. Michael McGough, P.E.
Director of Technical Services
National Corrugated Steel Pipe Association
14070 Proton Road, Suite 100
Dallas, TX 75244-3601

SUBJECT: Results of Immersion Testing; KTA-Tator, Inc. Project No. 390243-R1

Dear Mr. McGough:

In accordance with KTA-Tator, Inc. (KTA) Proposal Number PN199996 and the subsequent signed Authorization to Proceed dated April 3, 2019, KTA has completed the immersion and 48-hour spot testing. This report contains descriptions of the testing procedures employed and the results of the testing.

SAMPLES

The samples listed in Table 1 "Samples" were received from Elzly Technology Corporation on March 29, 2019. It should be noted that at no time did KTA personnel witness the acquisition of the samples listed below.

Table 1 – Samples

KTA ID	Description	Label
KTA-1 through KTA-9	9 – coated steel panels measuring 4" x 6"	Unlabeled
KTA-10 through KTA-11	2 – coated steel panels measuring 12" x 12"	Unlabeled

LABORATORY INVESTIGATION

The laboratory investigation consisted of immersion and 48-hour spot testing. The test descriptions and the results of the testing are provided below.

Immersion Testing

Immersion testing was performed in accordance with ASTM D543-14, "Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents." Two panels were placed into an immersion vessel with the immersion solution covering ¾ of the test panels. A third panel was exposed to the test solution by attaching a glass cell to the surface of the panel and adding an inch of solution. Photographs of panels, before and after exposure, are appended. The panels were exposed for a period of 30 days. Observations are reported in Table 2, "Observations After Immersion Testing."

Table 2 – Observations After Immersion Testing

Panel ID	Immersion Solution	Observations
1	10% sodium hydroxide	Severe blistering, color transfer, coating has softened and delaminated from panel
2		
10A		
3	10% sodium chloride	1 blister, approximately 1½" in diameter, was visible along bottom edge of panel. No color transfer or softening.
4		No blistering, softening, wrinkling, or loss of adhesion
10B		No blistering, softening, wrinkling, or loss of adhesion
5	30% sulfuric acid	No blistering, softening, wrinkling, or loss of adhesion
6		No blistering, softening, wrinkling, or loss of adhesion
10C		No blistering, softening, wrinkling, or loss of adhesion

Chemical Spot Test

Chemical spot testing was conducted in accordance with ASTM D1308-02(13), "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes." The spot test was conducted using the reagents listed below. For each reagent, 3 mL was placed on the panel and covered with a watch glass. After 48 hours the panel was rinsed with water and gently patted dry with a paper towel. The specimen was allowed to recover for 1 hour, and then the surface was examined with the unaided eye for evidence of blistering, softening, or loss of adhesion. Observations are reported in Table 3, "Observations After Spot Testing."

Table 3 – Observations After Spot Testing

Panel ID	Immersion Solution	Observations
9	10% sodium hydroxide	No. 8 medium blisters visible on top right of test area, color transfer
8	10% sodium chloride	No blistering, softening, wrinkling, or loss of adhesion
7	30% sulfuric acid	No blistering, softening, wrinkling, or loss of adhesion

If you have any questions concerning the testing or this report, please contact me by telephone at 412.788.1300 extension 230, or by email at mswogger@kta.com.

Sincerely,

KTA-TATOR, INC.

Melissa A. Swogger

Melissa A. Swogger
Project Manager/Laboratory Technician

R1 – A revision has been issued to include the results of 48-hour spot testing.

Appendix: Photographs

cc: Mr. Pete Ault <*pault@elzly.com*>

MAS/JMB:edg

Appendix

PHOTOGRAPHIC APPENDIX

KTA-1, Side 1, Pre-Immersion in 10% NaOH

KTA-1, Side 2, Pre-Immersion in 10% NaOH

KTA-2, Side 1, Pre-Immersion in 10% NaOH

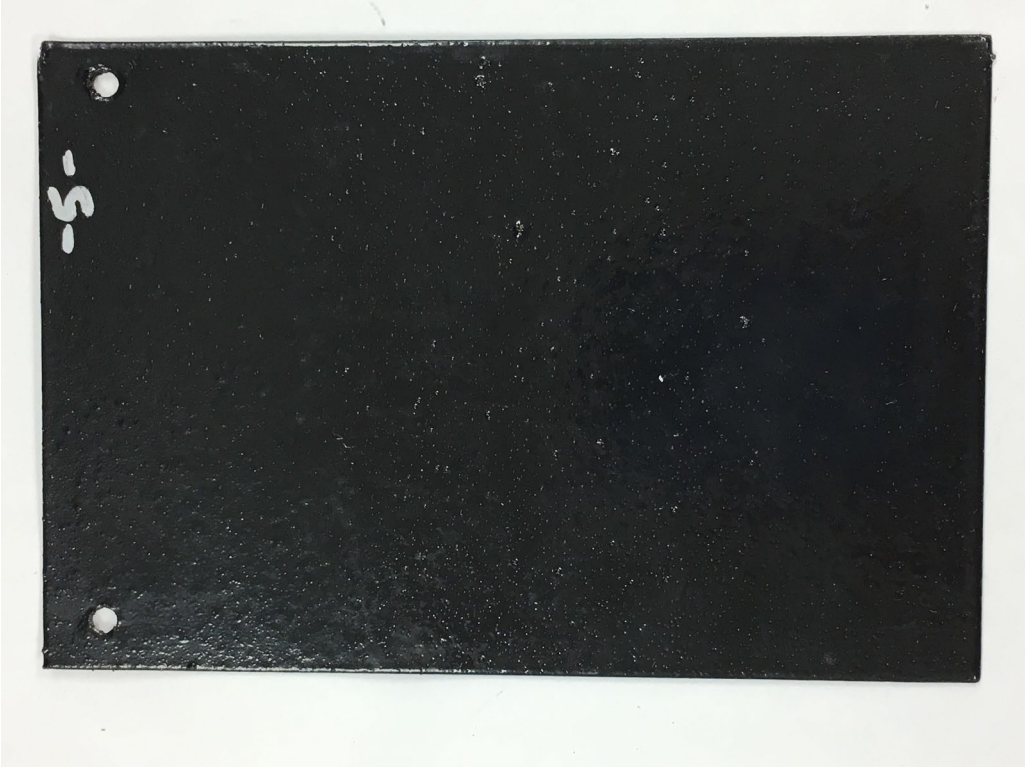
KTA-2, Side 2, Pre-Immersion in 10% NaOH

KTA-3, Side 1, Pre-Immersion in 10% NaCl

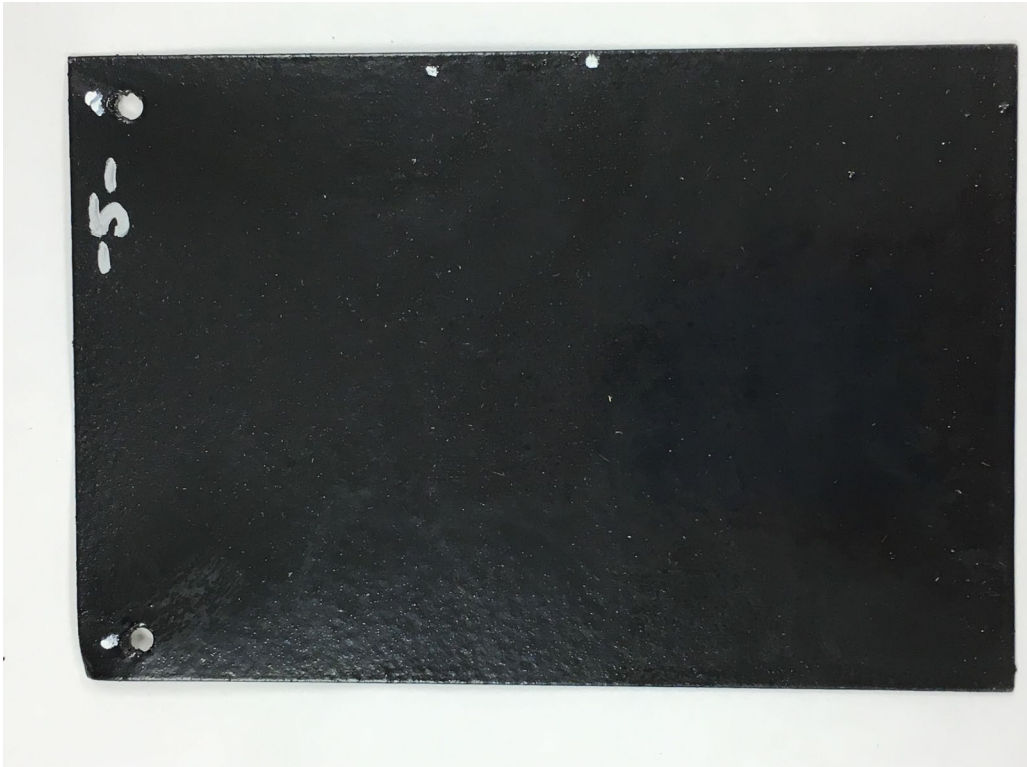
KTA-3, Side 2, Pre-Immersion in 10% NaCl

KTA-4, Side 1, Pre-Immersion in 10% NaCl

KTA-4, Side 2, Pre-Immersion in 10% NaCl



KTA-5, Side 1, Pre-Immersion in 30% H_2SO4



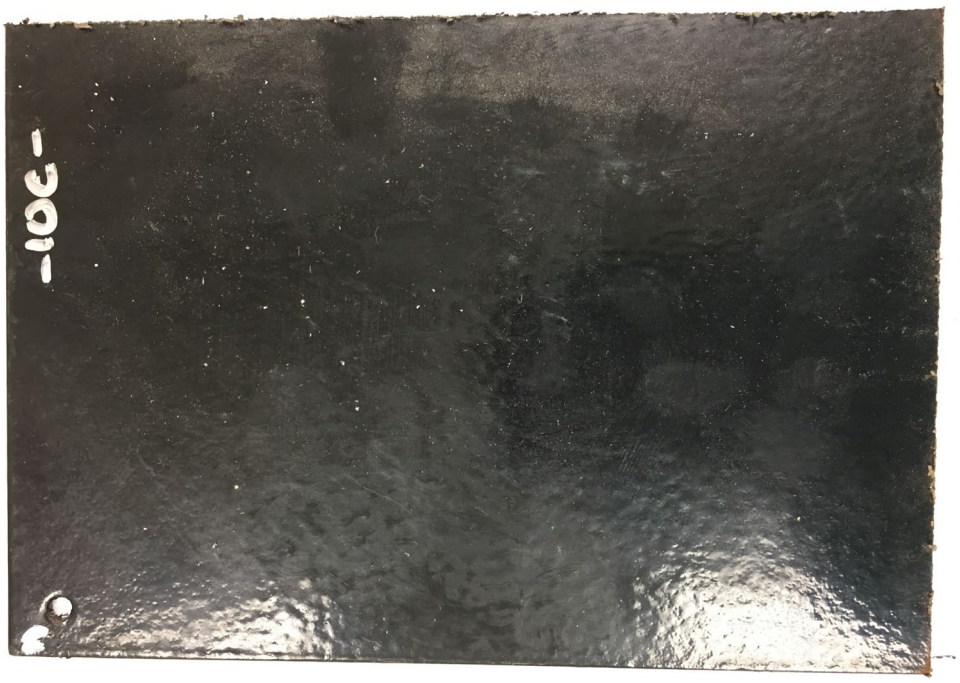
KTA-5, Side 2, Pre-Immersion in 30% H_2SO4

KTA-6, Side 1, Pre-Immersion in 30% H_2SO4

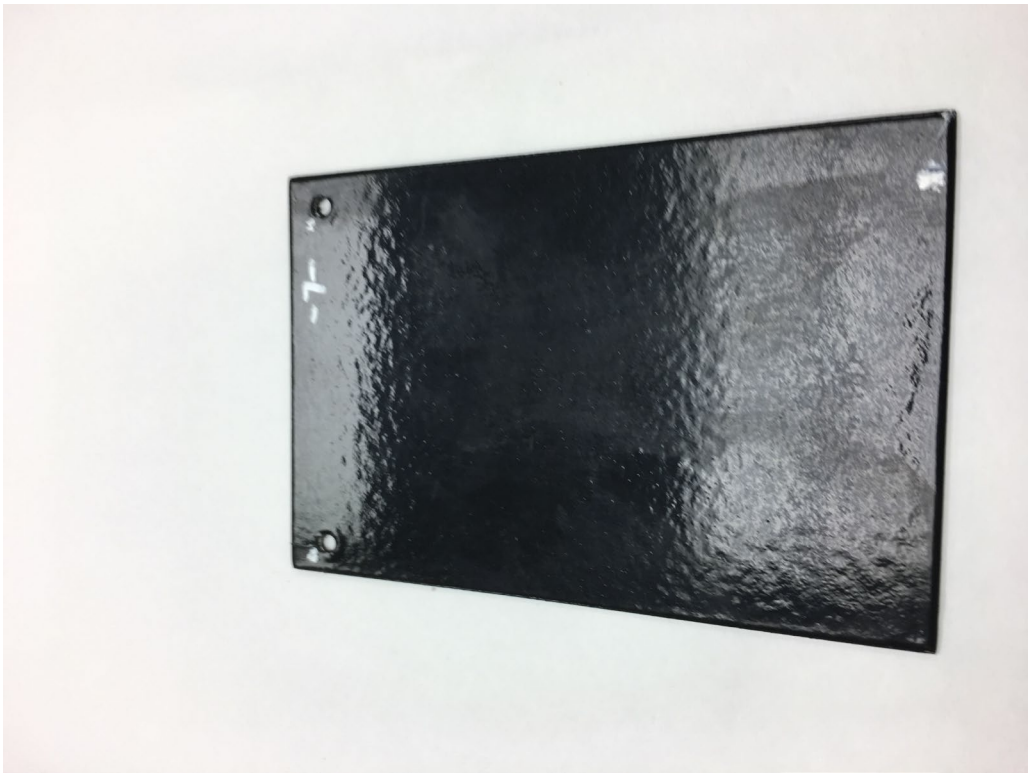
KTA-6, Side 2, Pre-Immersion in 30% H_2SO4

KTA-10A, Pre-Exposure to 10% NaOH

KTA-10B, Pre-Exposure to 10% NaCl

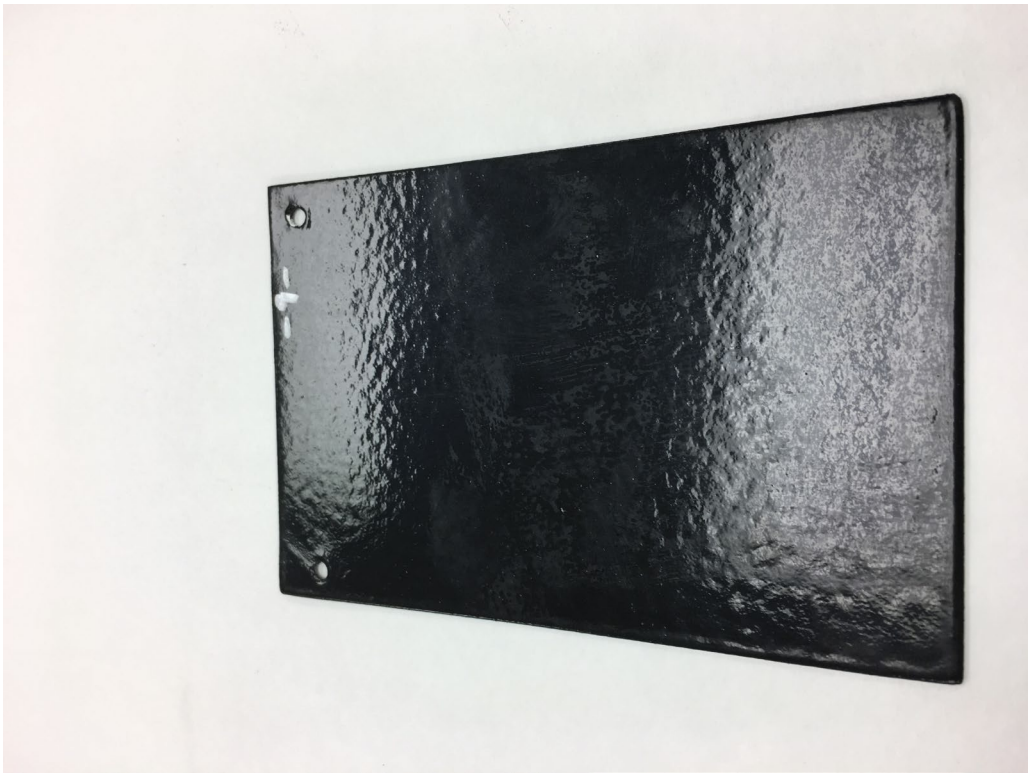


KTA-10C, Pre-Exposure to 30% H_2SO4



KTA-7, Pre-Spot Testing to 30% H_2SO4

KTA-8, Pre-Spot Testing to 10% NaCl

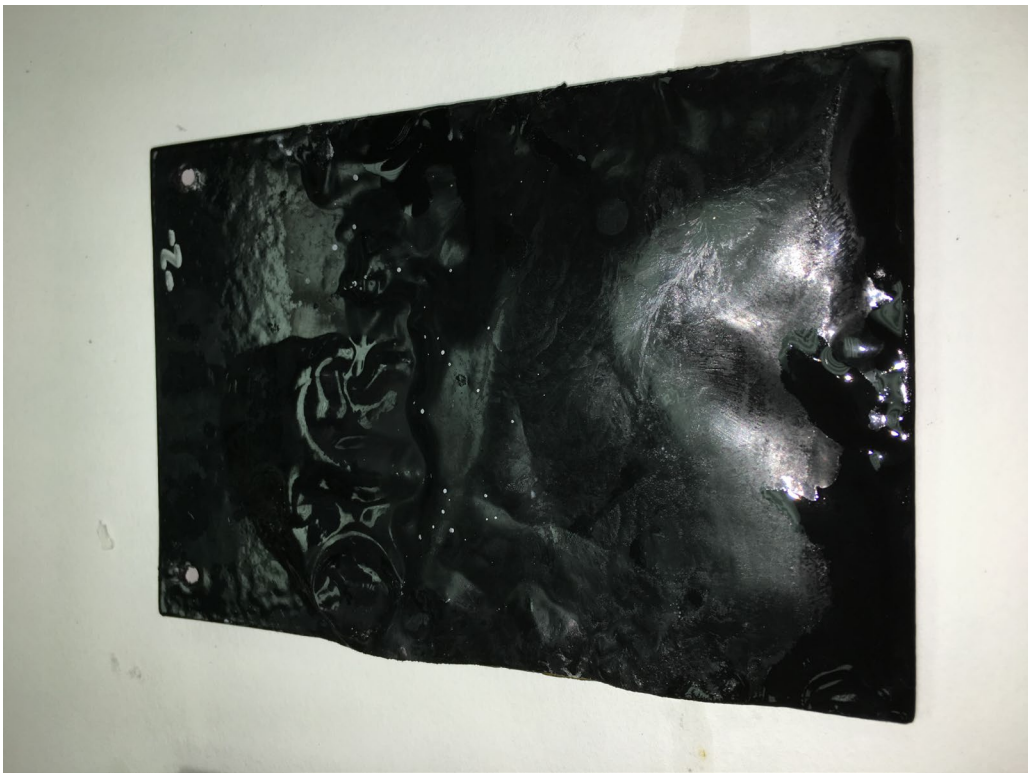


KTA-9, Pre-Spot Testing to 10% NaOH

KTA-1, Side 1, Post-Immersion in 10% NaOH

KTA-1, Side 2, Post-Immersion in 10% NaOH

KTA-2, Side 1, Post-Immersion in 10% NaOH



KTA-2, Side 1, Post-Immersion in 10% NaOH

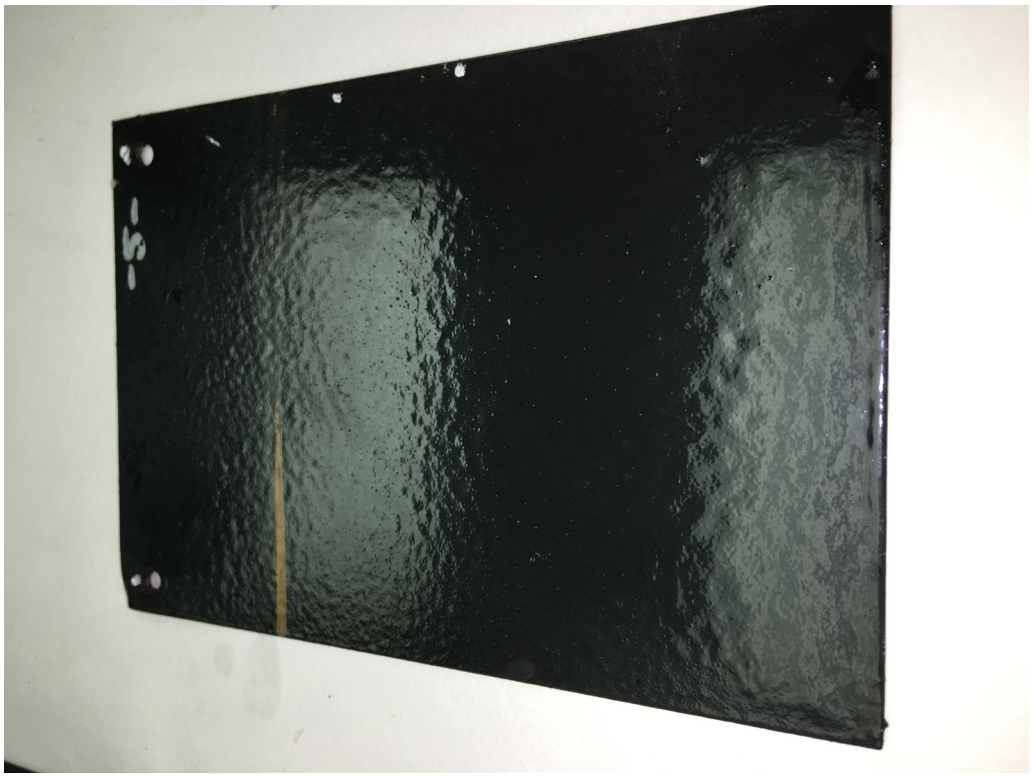
KTA-3, Side 1, Post-Immersion in 10% NaCl

KTA-3, Side 2, Post-Immersion in 10% NaCl

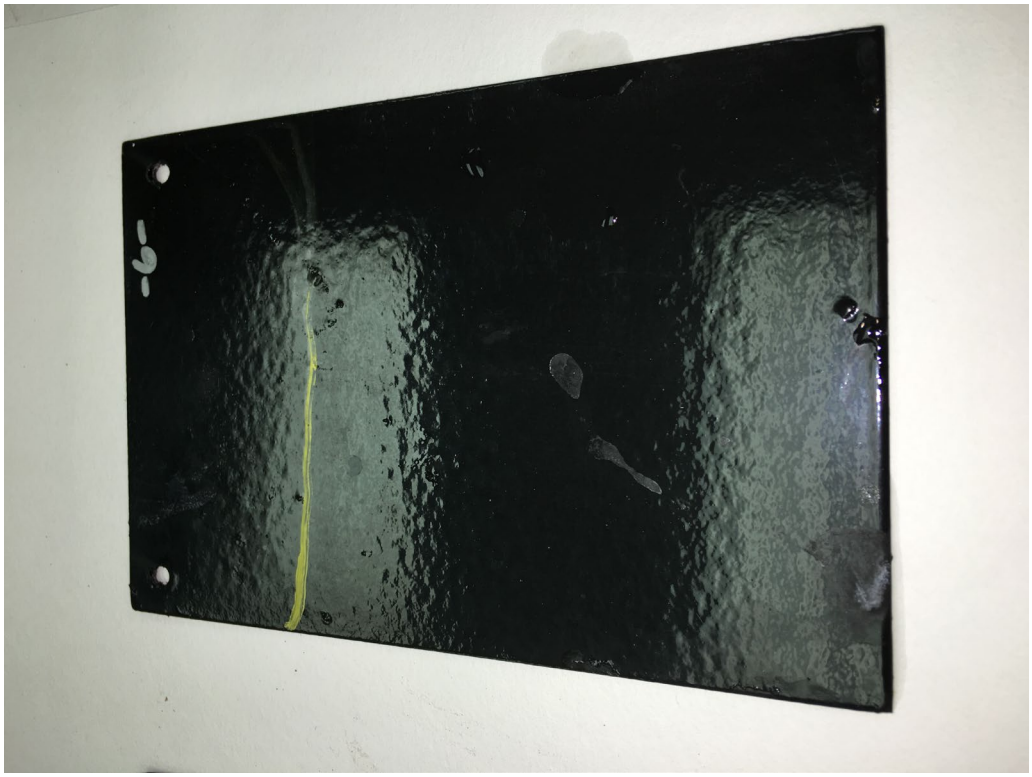
KTA-4, Side 1, Post-Immersion in 10% NaCl

KTA-4, Side 2, Post-Immersion in 10% NaCl

KTA-5, Side 1, Post-Immersion in 30% H_2SO4

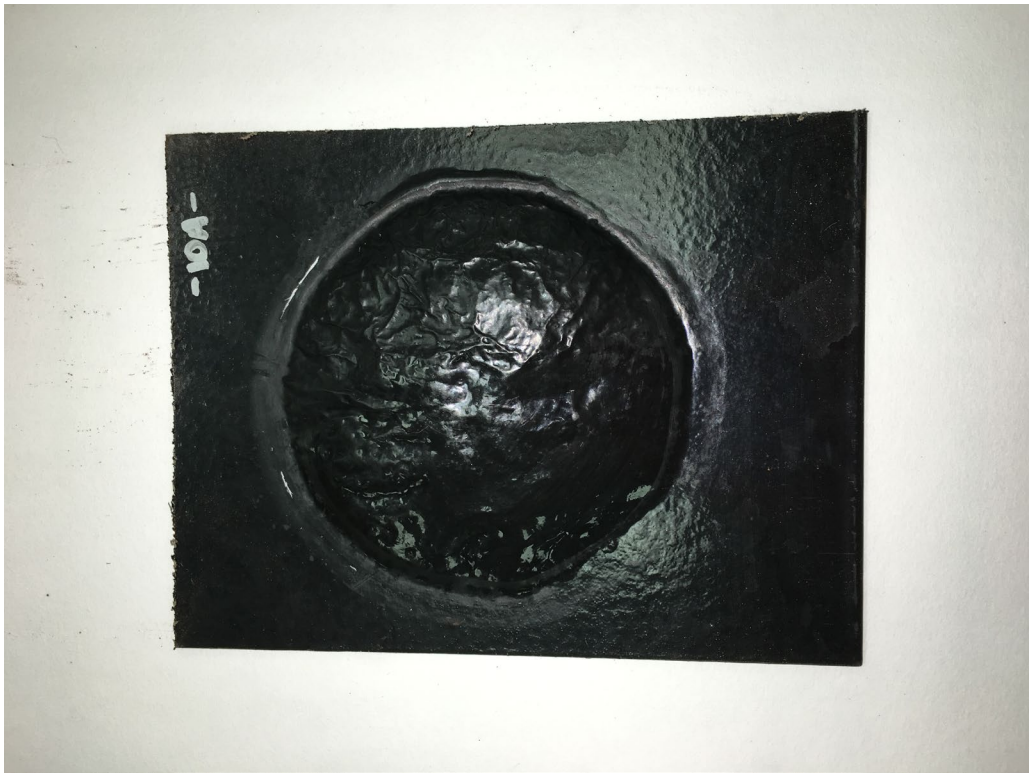


KTA-5, Side 2, Post-Immersion in 30% H_2SO4

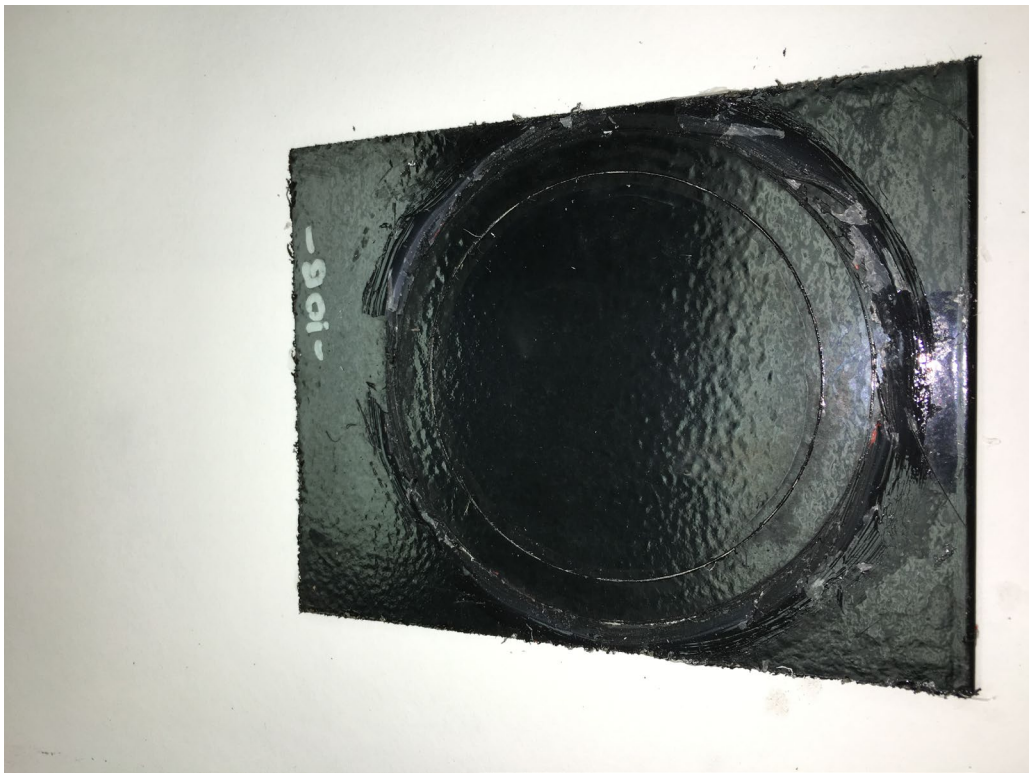


KTA-6, Side 1, Post-Immersion in 30% H_2SO4

KTA-6, Side 2, Post-Immersion in 30% H_2SO4

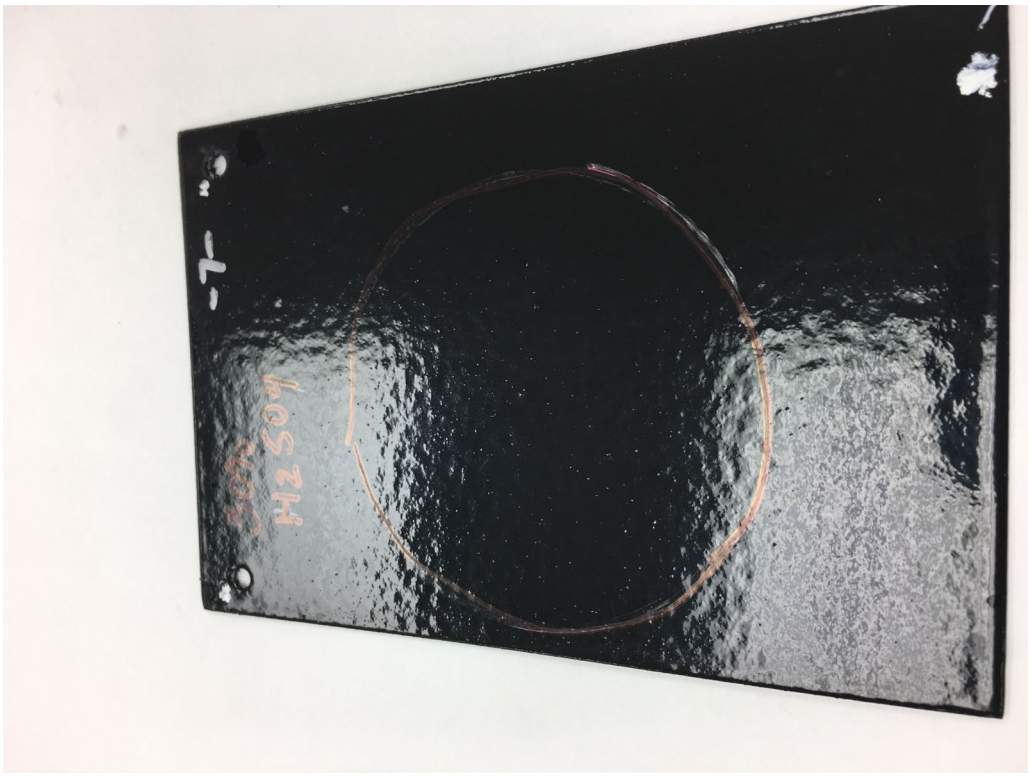


KTA-10A, Post-Exposure to 10% NaOH



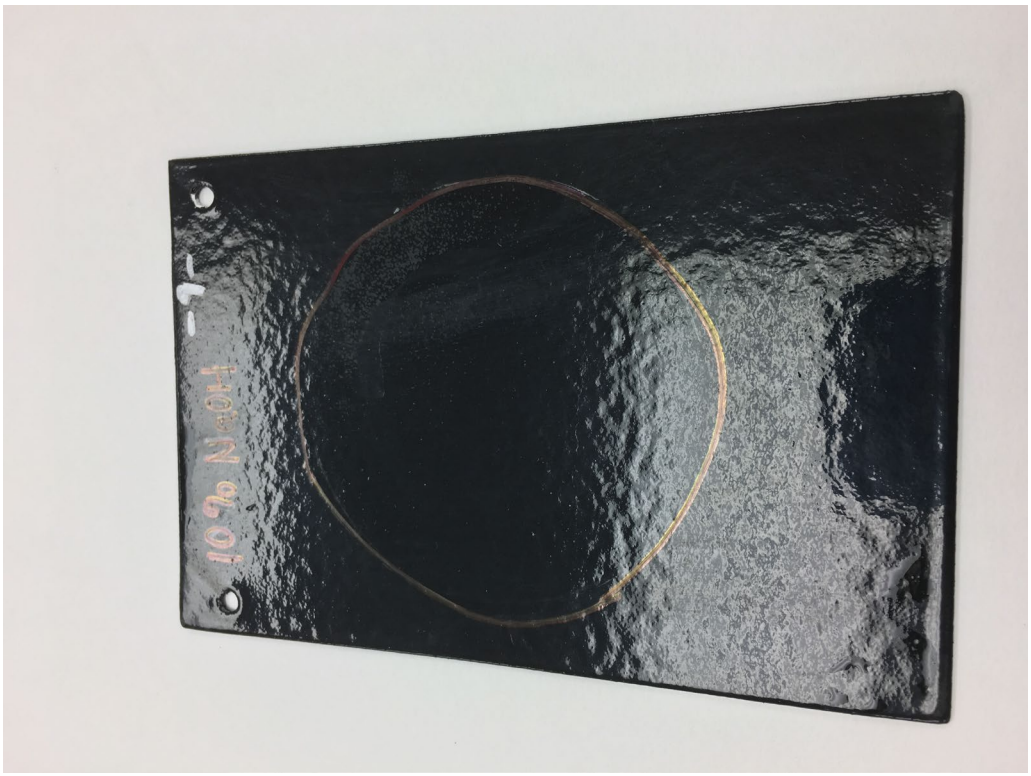
KTA-10B, Post-Exposure to 10% NaCl

KTA-10C, Post-Exposure to 30% H_2SO4



KTA-7, Post-Spot Testing to 30% H_2SO4

KTA-8, Post-Spot Testing to 10% NaCl



KTA-9, Post-Spot Testing to 10% NaOH