

## Ricobond® 5110 and Ricobond® 5120 Additives that Enable Hot Melt Adhesives to be Removed with Caustic



### Benefits

- Impart caustic solubility/removability
- No impact on adhesive performance

### Ricobond 5110

- Acid-functional aliphatic-compatible polymer

### Ricobond 5120

- Acid-functional aromatic-compatible polymer

### Target Markets

- Soluble polymers
- Label adhesives

### Additional Information

**MSDS/TDS:** Ricobond 5110 and 5120

### Description

Conventional styrenic block co-polymer-based hot melt pressure sensitive adhesives (SBC HM PSA) are known for their excellent tack and adhesion to a wide variety of materials. Another well-known characteristic of these adhesives is their ability to resist water and aqueous solutions of acid and base. A novel set of additives has been developed that impart caustic solubility to these adhesives with no impact on the performance of the adhesive.

Cray Valley has developed additive technology that allows the adhesive formulator to develop hot melt pressure sensitive adhesives (HM PSA) that are caustic-soluble without sacrificing the performance of the adhesive. The technology consists of two additives that are easily added into the adhesive during the typical mixing process.

Table 1 Additives

| <i>Product</i> | <i>Description</i>   | <i>Function</i>   |
|----------------|--|---|
| Ricobond 5110  | Premium acid-functional aliphatic polymer<br>100% active<br>Viscous liquid | Aids in dispersing the aliphatic portion of the adhesive<br>Newest technology |
| Ricobond 5120  | Acid-functional aromatic polymer<br>100% active<br>Available in flake form | Aids in dispersing the aromatic portion of the adhesive                       |

# TECHNICAL UPDATE

Ricobond® 5110 and Ricobond® 5120: Additives that Enable Hot Melt Adhesives to be Removed with Caustic

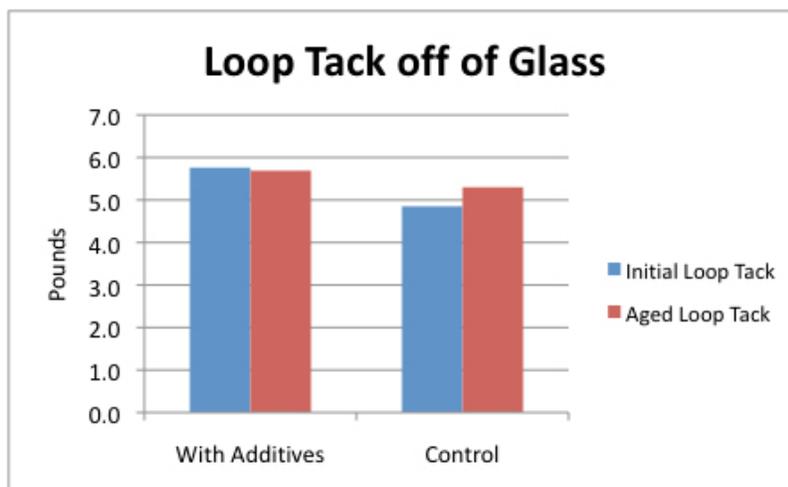


To demonstrate the ability of these additives to impart caustic solubility, and therefore removability, to a HM PSA, we evaluated the performance in a typical label adhesive formulation as seen in Table 2.

Table 2. Model Adhesive Formulation

| <i>Component</i> | <i>Description</i>         | <i>Amount, parts</i> | <i>Weight % Total</i> |
|------------------|----------------------------|----------------------|-----------------------|
| Kraton® D1113    | Linear SIS block polymer   | 100                  | 37.6                  |
| Wingtack® ET     | Tackifying resin           | 120                  | 45.1                  |
| Nyflex® 222B     | Naphthenic process oil     | 20                   | 7.5                   |
| Ethanox® 310     | Antioxidant                | 2                    | 0.8                   |
|                  | <b>Sub-total</b>           | <b>242</b>           | <b>91.0</b>           |
| Ricobond® 5110   | Premium aliphatic additive | 12                   | 4.5                   |
| Ricobond® 5120   | Aromatic additive          | 12                   | 4.5                   |
|                  | <b>Total</b>               | <b>266</b>           | <b>100.0</b>          |

The additive package required for caustic solubility of a SBC HM PSA consists of a mixture of Ricobond 5120 for solubilization of the aromatic portion of the adhesive, in combination with Ricobond 5110 for solubilization of the aliphatic portion of the adhesive. The following data was generated with a 50:50 mixture of Ricobond 5110 and 5120, but combinations ranging from 75:25 to 25:75 may be used depending upon the composition of the SBC chosen. Higher styrene SBCs will require proportionally more Ricobond 5120.



All adhesive performance testing was completed using 2 mil PET film coated with 0.9 mil of adhesive.

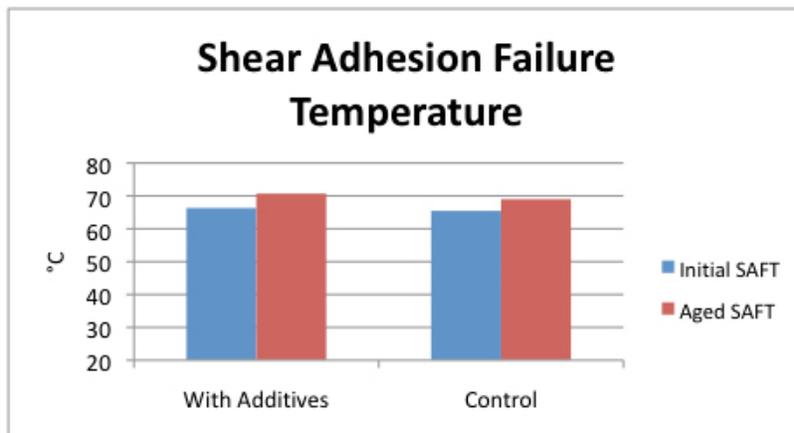
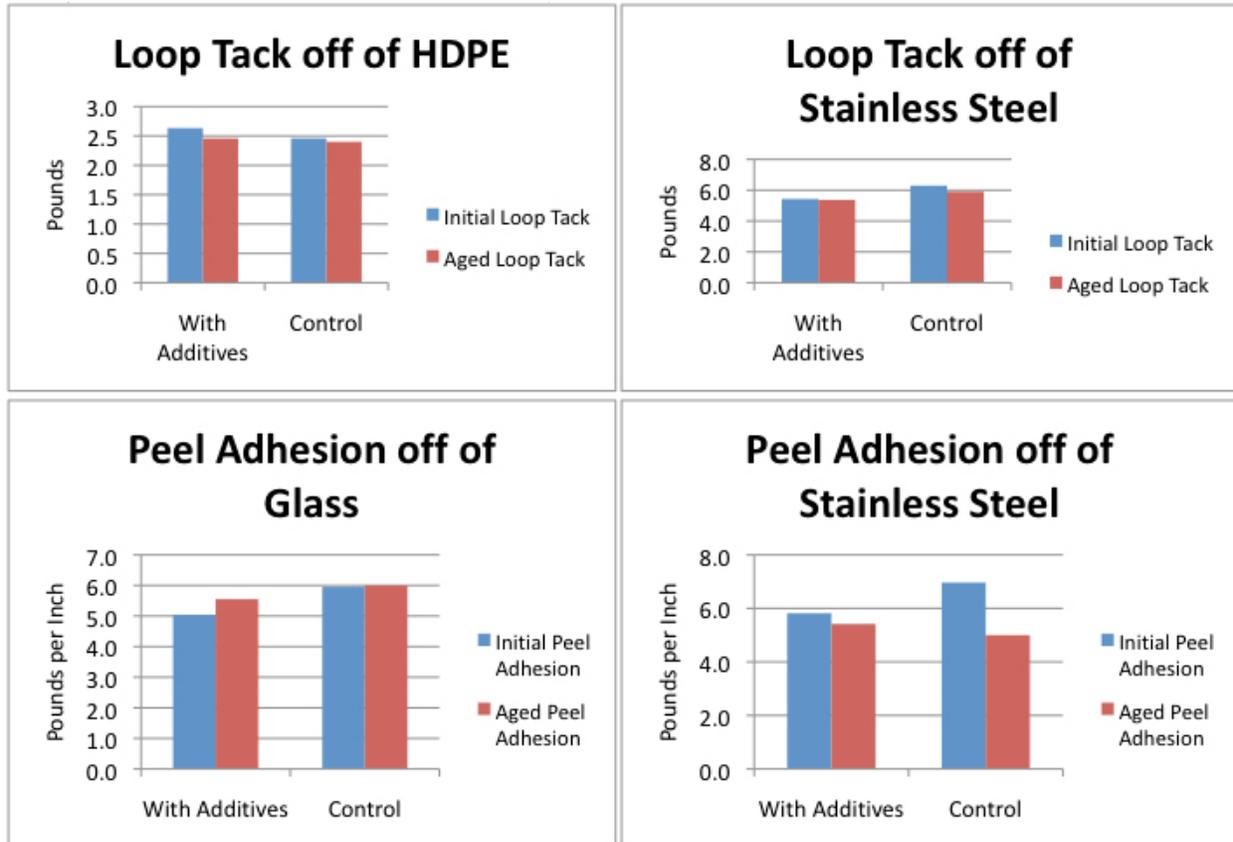
Any differences exhibited in the data can generally be attributed to normal "noise" due to coating and testing of these materials in a laboratory setting. Other than the caustic solubility, if there is a possible difference in performance between the adhesive with additives versus the control, it is the improvement seen in the peel adhesion off of HDPE, but this would have to be verified by additional testing.

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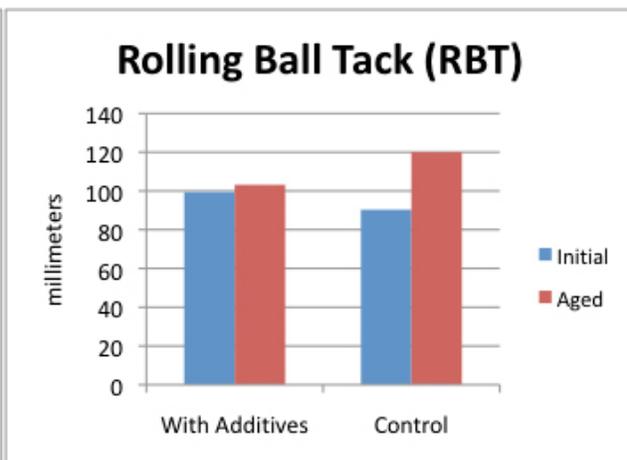
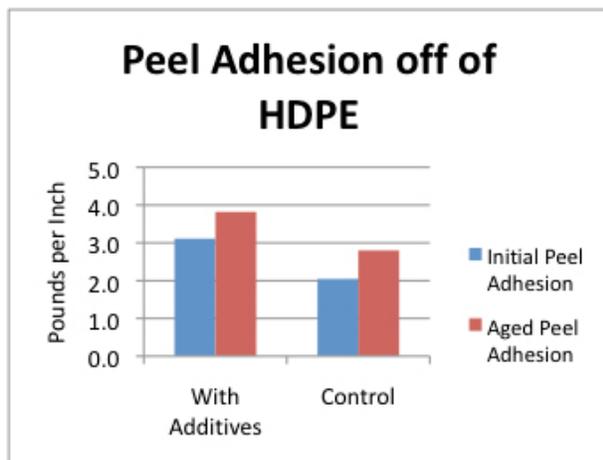


Note that the aged samples are materials that were tested after accelerated aging in a forced-air oven for seven days at 70 °C, which is commonly believed to simulate a one-year shelf-life.



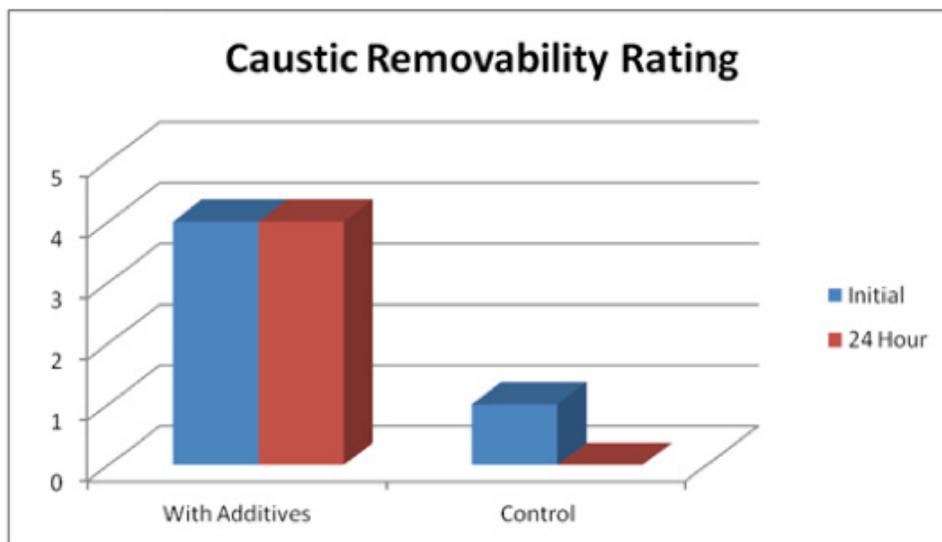
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## Caustic Solubility and Removability

Caustic solubility was determined and rated on a 0 to 5 scale where a rating of 0 indicates that the caustic had absolutely no effect upon the adhesive specimen. A rating of 5 indicates that the adhesive and test specimen were completely removed within the five-minute time limit with no visible adhesive residue of any kind, including no visible “stickies” in the caustic solution.



The caustic solubility was determined on adhesive samples 15 minutes after application to glass panels and another set of samples where the adhesive specimens were allowed to build adhesion for 24 hours before immersion in the caustic solution. The results demonstrate the effectiveness of just 10 parts of additive per 100 parts of adhesive at imparting caustic solubility and label removability.

# TECHNICAL UPDATE

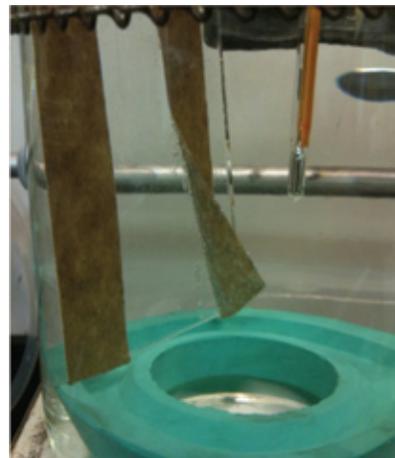
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The photo shows a paper label quickly coming loose in the caustic solution less than one minute after immersion.

## Summary

The newly developed Ricobond additives from Cray Valley induce caustic solubility in styrenic block co-polymer-based hot melt pressure sensitive adhesives without significantly impacting the highly desirable peel adhesion and tack that hot melt adhesives are known by.



## Appendix

Kraton is a trademark of Kraton Polymers LLC.

Nyflex is a trademark of Nynus Chemical Co.

Wingtack is a trademark of Cray Valley.

Ethanox is a trademark of Albemarle.

Ricobond is a trademark of Cray Valley.

| <i>Test Description</i>                   | <i>Test Method Standard</i> |
|---|-----------------------------|
| Peel Adhesion                             | PSTC-101 180° Peel Adhesion |
| Shear Adhesion Failure Temperature (SAFT) | PSTC                        |
| Loop Tack                                 | PSTC                        |

## Caustic Solubility Test

- 1" strips on glass
- 15 minutes & 24 hours on glass
- 5 minute maximum immersion time
- 80 °C using 2.5% NaOH
- Mild agitation (no vortex)

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