Cola®Cor KAT

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The Challenges

- It has been a conundrum to achieve multimetal protection with a single organic corrosion inhibitor or single type of organic corrosion inhibitors.

  - Why?

  - Not all metal surfaces created equal. Different metals have different surface properties, i.e., ferrous vs. aluminum

  - Different metals respond to different type of chemistry when it comes to corrosion protection.

    - The best corrosion inhibitor for one type metal/alloys may just simply not work for another type of metallic materials/alloys

Is there any organic film-forming corrosion inhibitor responding to multimetal surfaces?

Chemical Approaches to Enable the Multimetal Protection

Enabling Chemistry

- Triazoles/Thiadiazoles
- Carboxylic acid/amine salts
- Phosphate Esters
- Sulfonates
- Polymeric corrosion inhibitors

Phosphate Ester Based Corrosion Inhibitors

Cola®Cor THE
Cola®Cor ACI
Cola®Cor 900
Cola®Cor 910

- Mix of mono- & di-phosphate esters
- Water soluble or oil soluble
- Fully Water soluble upon neutralization
- Low foam or suppressing foam formation

Key Performance Attributes

- Provides ferrous protection
- Enables corrosion protection for non-ferrous metals, i.e., aluminum and yellow metals
- Compatible with, and capable of boosting the corrosion performance of other corrosion inhibitors
- Offers EP wear protection

Applications

- MWF
- Metal cleaning
- Paint and coatings

Metalworking fluids: Current options for machining multi-metal alloys: TLT, 2022 (3), 44-56

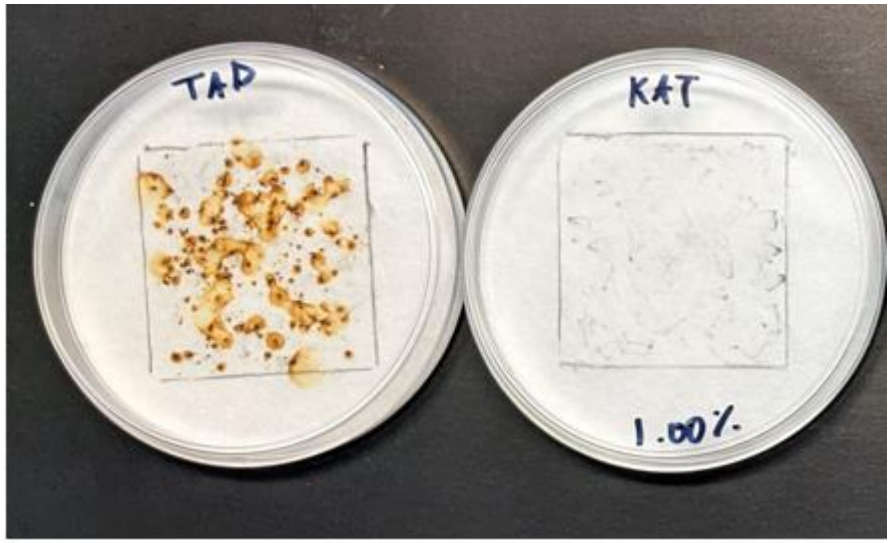

Cola®Cor KAT
One solution, for when you have more than one problem.

Cola®Cor KAT

- Mixed phosphate esters
- In sodium salt form
- Anionic
- Colorless to lightly yellow, clear liquid
- Water soluble
- ~55% actives

PROPERTY	SPECIFICATION
APPEARANCE	CLEAR SLIGHTLY YELLOW LIQUID
COLOR, GARDNER BYK	2.0 max
pH (AS IS@25C)	7.5 – 8.5
%SOLIDS	53.0 – 57.0
%BUTANOL	3.0 MAX

Ferrous Protection



Blank **ColaCor KAT**

- In local tap water (80 ppm hardness)
- At pH 9.0
- At ambient temperature
- Cast Iron Chips (per ASTM D4627)
- **ColaCor KAT provides sufficient ferrous protection @ 1%.**

Al Corrosion/Staining Testing

- 3% ColaCor KAT solution in local tap water (120 ppm hardness)
- pH 8.5
- Al 6061
  - A magnesium/silicone alloy
  - Popular & suitable for aircraft building
- 24 hours at ambient temperature

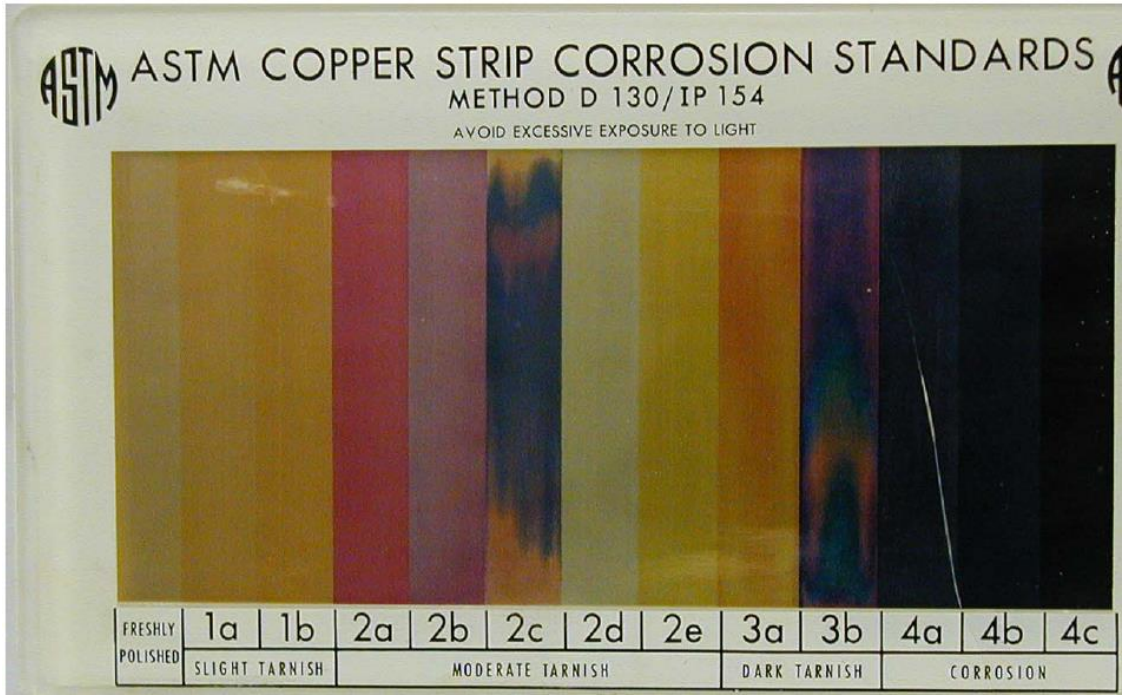
(Fresh A6061)

ColaCor KAT

- No Staining
  - Mass loss <0.0002 mg
  - [Al] <5 ppm in the test solution

Copper Corrosion (Mod. ASTM D-130)

- 2 % solution in local tap water (120 ppm hardness)
- pH 8.5
- Copper coupon
- Tested per a modified ASTM D130 method - 6 hours @ 80 °C
- ColaCor KAT offer effective copper corrosion protection equivalent to the competition.



- Rating: 1a/1b
- [Cu]: <3ppm

Application Case Study: ColaCor KAT for In-can Corrosion Protection for Aerosol Cans

- Case 1: Spray Paint Aerosol Cans
  - Study conditions
    - Tin-plated steel
    - ColaCor KAT treated at 1 wt%
    - Deionized water used
    - pH @ 8.5
  - The pitting corrosion testing under cyclic polarization current
    - An accelerated study @ 1. 25V for 48 hrs
    - A month-long study @ 0. 25V
  - **ColaCor KAT provides sufficient corrosion protection for the tin-plated steel up to 2 years.**

- CASE 2: Disinfectant Spray Can
  - Goal: to replace boron-based corrosion inhibitors to meet the regulatory requirement for application.
  - Study done at the 1:1 replacement
  - **ColaCor KAT offers the equivalent corrosion protection to the boron-based corrosion inhibitors**

Ongoing In-formulation Evaluation in a Full Synthetic MWF

Ingredient	Function	A	B	C
DI Water	Water	62.7	62.7	62.7
Monoisopropanolamine	Alkalinity booster	3.0	3.0	3.0
Triethanolamine	Alkalinity booster	10.0	10.0	10.0
ColaCor 300	Corrosion Inhibitor, amine carboxylate	8.0	8.0	8.0
ColaCor RP	Amine borates	4.0	4.0	4.0
Reference*	Conventional amine carboxylates	6.0		
Water blank*	Water blank		6.0	
ColaCor KAT*	Candidate Phosphate esters			6.0
EO-PO Block Polymers	Alkoxylate-based lubricity additive	4.0	4.0	4.0
Fungicide	Fungicide	0.3	0.3	0.3
Bactericide	Bactericide	2.0	2.0	2.0

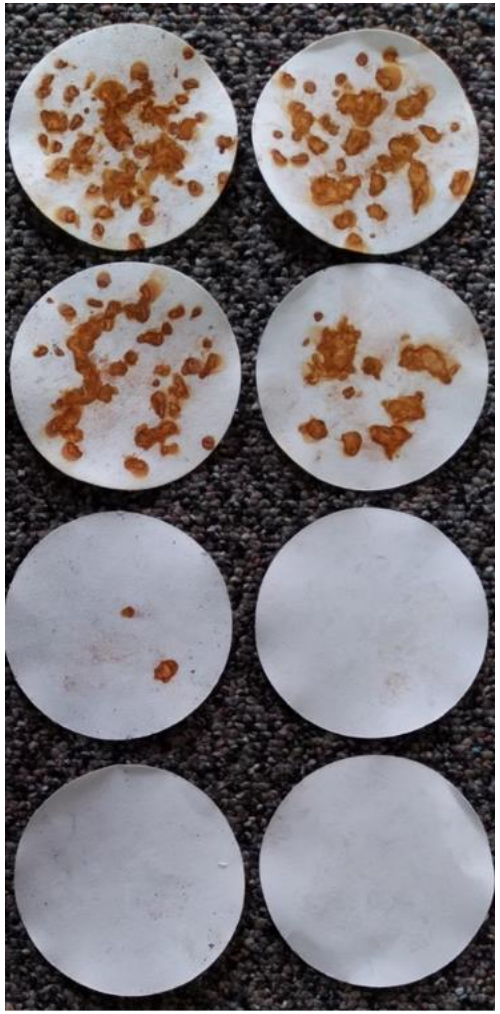
No defoamers added

Ferrous Protection

- Dilution at 2.5 ~ 5.0 % (150 ppm water hardness)

- Testing Protocols
  - Modified D4627
  - 5-min soaking to mimic the actual MW process followed by a 24-hr @ ambient temperature

- **At the 4% dilution: full ferrous protection achieved (150 PPM water hardness)**
  - The actual treat rate of ColaCor KAT is at 0.24%



Water Blank (B) ColaCor KAT (C)

Preliminary Al Staining Evaluation

- 5% dilution with local tap water (150 ppm)
- 24 hours at ambient temperature
- pH at ~ 9.5
- **Directionally ColaCor KAT shows advantage over conventional amine carboxylates on Al staining**

Reference (A) **ColaCor KAT (C)**

Targeted Applications

- Aerosols
  - Paint & Coatings
  - Sealants
  - Personal care
- Metal cleaners
  - Alkaline metal cleaners
- Surface treatment
- Metal working fluids
  - Full synthetic MWF
- Textile chemicals
  - Antistatic agent
  - Corrosion protection

Regulatory Listings

- USA (TSCA)
- Canada (NDSL)
- China (IECSC)
- Korea (KECL)
- Taiwan (TCSI)

Cola®Cor KAT

- A neutralized phosphate ester blend
- Enables ferrous, aluminum, and yellow metal protection
- Further in-depth evaluation in wide variety of applications is still underway

Will Cola®Cor KAT provide you the opportunity to address the regulatory impact of tolyltriazole? You are invited to check it out in your own formula!

Thank You!

Further info & samples: https://colonialchem.com/products/colacor-kat/

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