Viable Chromium (VI) - Free Treatment for Aluminum

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Aluminum Finishing

- Cr⁶⁺ is ubiquitous in its use for corrosion protection
 - Basis of best corrosion resistant products aluminum conversion coating, aluminum anodize sealing, sacrificial coating post treatment, phosphate coating "rinsing", magnesium conversion coating and anodizing, also as main corrosion inhibiting species in primers, topcoats, sealants, and other coatings
 - Very mature: used for 50 plus years
 - Very robust, inexpensive (to purchase), and easy to use
 - Inhibits corrosion on multiple materials: Al, Fe, Mg, Zn, Cd

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- Comfort level of users is "high"

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Drivers for Cr⁶⁺Alternatives

Executive orders – US government usage EO 13148 stipulates a 50% reduction in use of priority chemicals by EY06

European Union Directive 2000/53/EC "End of Life Vehicle Directive"

Article 4, Section 2 (a): bans Cr⁶⁺ after July 1, 2003 except for 2 gm/vehicle

Ability to delete Cr⁶⁺ exemption in future

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		Proposed	Crill	Cr and Crill	Zr	Co			Мо		
Material	CrVI	CrVI	(soluable)	(insoluable)	(compounds)	(metal/dust)	Ni/Nill	Ce	(soluable)	Zn/Znli	AI
	100										
	micrograms/m3	0.5 to 5									
Current	(1.0 mg/10m3)	micrograms/									
PEL	(ceiling)	m3, or lower	0.5 mg/m3	1 mg/m.s	5.0 mg/m.s	0.1 mg/m.s	1.0 mg/m3	NA	5.0 mg/m3	5.0 mg/m3	5.0 mg/m
	29CFR	Lurie	29CFR	29CFR	29CFR	29CFR	29CFR		29CFR	29CFR	29CFR
	1910.1000	Declaration,	1910.1000	1910.1000	1910.1000	1910.1000	1910.1000		1910.1000	1910.1000	1910.100
Reference	Table Z-2	2/2002, etc.	Table Z-1*	Table Z-1	Table Z-1	Table Z-1	Table Z-1	NA	Table Z-1	Table Z-1	Table Z-1

Expedited Rulemaking Schedule				
Rulemaking Milestone	Time Allotted	ETA for completion		
	Development of a Proposed Rule	>		
Initial Ru	lemaking	December 4, 2002		
Contractor preparation and OSHA/Peer Review of economic/technical feasibility analysis	12 months	December 4, 2003		
SBREFA Process	4 Months	April 4, 2004		
Staff finalization of proposed rule and Secretary's review	3 Months	July 4, 2004		
OMB review	2.5 Months	September 19, 2004		
Final revisions and publication in Federal Register	0.5 Month	October 4, 2004		
Total	22 M	onths		

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Expedited Rulemaking Schedule						
Rulemaking Milestone	Time Allotted	Approximate date of completion				
Development of a Final Rule						
Notice and Comment Period	3 Months	January 4, 2005				
OSHA public review of comments/hearing preparation	1 Month	February 4, 2005				
Public Hearings	.75 Month	February 25, 2005				
Posthearing comments and briefing	2 Months	April 25, 2005				
OSHA production of final rule	6 Months	October 25, 2005				
OMB review	2 Months	December 25, 2005				
Final revisions and publication	.75 Month	January 18, 2006				
Total	15.5 Months					
Total - Proposed and Final Rule	37.5 Months					
		— NAVØAIR—				

SI	lide	10
	nuc	10

Revised PEL Current PEL: 100 ug/m³ Chromic Acid 52 ug/m³ Cr ⁶⁺ (ceiling concentration)							
Revised PEL numbers in micrograms/meter ³							
PEL	10	5	1	0.5	0.25		
Action Level	5	2.5	0.5	0.25			
STEL	52	52					
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Drivers for Cr⁶⁺Alternatives

Local/state regulations- strong impact on base needs

- Non-spray, Cr⁶⁺ manual conversion coating application to comply with local requirements
- Cr⁶⁺ paint emissions are largest drive, no grinding, sanding

Shipping & Storage

- Cr⁶⁺ products classified as DOT Class 8, Packing Group I or II (49CFR172.101)
- TCP products are classified non hazardous under 49 CFR 172.101 and 173.137

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What is TCP?

TCP: Trivalent Chromium Processes

- US patents (US gov't owned) on composition and processes for aluminum pretreatment, aluminum anodize post treatment
 - 6,375,726; 6,511,532; 6,521,029; 6,527,841
- Non-exclusive licenses issued for current US/foreign markets, commercially available products forthcoming

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What Does Cr³⁺ Offer

• Process robustness - drop in replacement

 solutions are applied just like Cr⁶⁺ products, in some cases with reduced temperatures (for anodic sealing), and are compatible with all commonly used process equipment

- Cost to purchase and maintain chemistry similar to commercial Cr⁶⁺ products
- Simple- one solution that can be sprayed on, wiped on, or used in tank immersion processes

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Drivers for Implementation

- Coatings need to work on a variety of alloys with a wide variety of subsequent coatings like primers, topcoats, sealants, CPCs, etc.
- Technical performance: corrosion resistance, adhesion and electrical properties must be as good as with CrVI or better, especially in regard to life requirements
- Most alternatives to date do not come close to these criteria



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