

# DETOXING WET-END CHEMICALS AND LEATHERS, READY TO REALIZE IT!

**Roberta Gamarino**, R&D Manager – Italy  
[roberta.gamarino@stahl.com](mailto:roberta.gamarino@stahl.com)

## CHEMISTRY KEEPING EVOLVING



Evolution of science



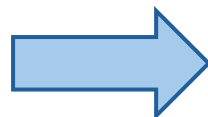
Environmental knowledge  
and respect



New market needs



Local/International  
Regulations



### NEW PRODUCTS

- Improved eco-toxicological profile
- Reduced health concerns
- Minimal impact on environment
- Same/Improved efficiency

# STUDY 1- New Tanning System

## Leather Tanning at a Glance

- Chrome tanning

**~80 %**

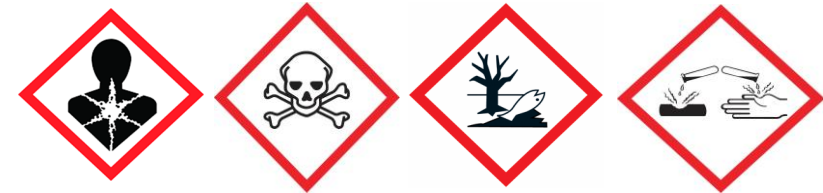
of global leather production

- Glutaraldehyde tanning

**~70%**

of the chrome-free tanning segment

**However, their use is also associated with environmental and health considerations.**



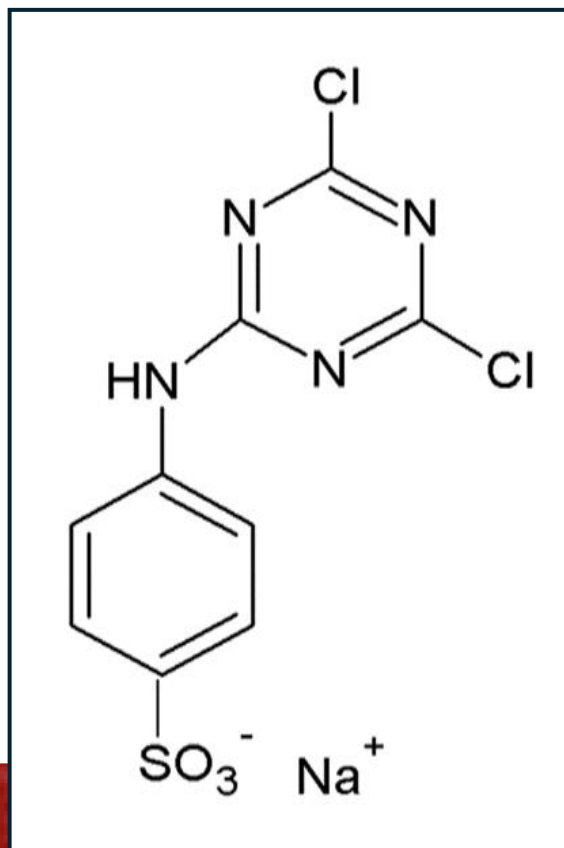
**Toxicity Cr(VI) and Glutaraldehyde**

# STUDY 1 – New Tanning System

Approach to Cr(VI) and Aldehydes solution

***New Chemistry: New sustainable tanning system***

Sodium p-[(4,6-dichloro-1,3,5-triazin-2-yl)amino] benzenesulphonate



***Allergic skin  
reaction***

***Serious eye  
damage***

Classification according to Regulation ( EC )  
No. 1272/2008[CLP/GHS]

<b>Acute Oral Toxicity</b>	LD50	>2000 mg/kg	OECD 423 –Acute Oral Toxicity	<b>Not classified</b>
<b>Acute Dermal Toxicity</b>	LD50	>2000 mg/kg	OECD 402- Acute Dermal Toxicity	<b>Not classified</b>
<b>Skin sensitization</b>		>1 %	Guinea pig maximisation test and Human Repeated Insult Test	<b>Skin Sens. 1</b> H317: may cause an allergic skin reaction
<b>Respiratory sensitization</b>		Not sensitizing	GARDair In vitro respiratory sensitization assessmentt	<b>Not classified</b>
<b>Skin Irritation/corrosion</b>		Not irritating	OECD 439 In vitro Skin Irritation	-
<b>Eye Irritation/Corrosion</b>		Irreversible effects on the eyes	OECD 405- Acute Eye Irritation/ Corrosion	<b>Eye Damage 1</b> H318: causes serious eye damage
<b>Specific target organ toxicity</b>		No human evidence of respiratory tract irritation	-	<b>Not classified</b>
<b>Preliminary prenatal development toxicity in rats</b>		-	OECD 414 Prenatal developmental toxicity study	<b>Not classified</b>
<b>Teratogenicity</b>		-	OECD 422 Combined Repeated Dose Toxicity Study	<b>Not classified</b>

Biodegradability		55.1 %	OECD 301F Ready Biodegradability	Not easily biodegradable
Toxicity to microorganisms	NOEC	320 mg/L	OECD 209 Activated Sludge	<b>No inhibitory effect</b> up to 320 mg/L
Toxicity to microorganisms	EC50	>1000 mg/L	OECD 209 Activated Sludge	<b>No inhibitory effect</b> up to 320 mg/L
Short- term toxicity to fish	LC0	143 mg/L	OECD 203 Fish, Acute Toxicity Test	<b>Not classified</b>
Short- term toxicity to fish	LC50	>> 143 mg/L	OECD 203 Fish, Acute Toxicity Test	<b>Not classified</b>
Toxicity to aquatic algae	NOEC	143 mg/L	OECD 201 Alga, Growth Inhibition Test	<b>Not classified</b>
Toxicity to aquatic algae	EC50	> 143 mg/L	OECD 201 Alga, Growth Inhibition Test	<b>Not classified</b>
Short- term toxicity to aquatic invertebrates	EC50	> 100 mg/L	OECD 202 Daphnia sp. Acute Immobilization Test	<b>Not classified</b>
Long- term toxicity to aquatic invertebrates ( on reproduction )	NOEC	143 mg/L	OECD 211 Daphnia Magna Reproduction Test	<b>Not classified</b>

# STUDY 1 – New Tanning System

## Further Benefits



Less  
water  
needed



Less  
energy  
needed



Less salt  
in waste  
water



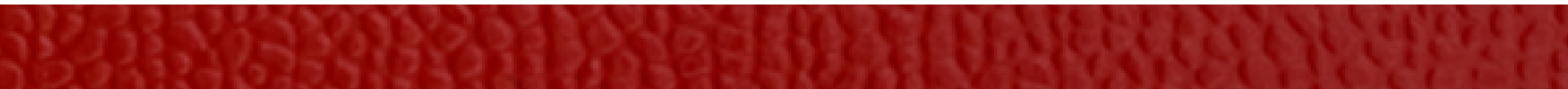
Shortens  
production  
time



One tanning  
chemical  
instead of more



Simplified  
process





# STUDY 1 – New Tanning System

## Compost

EcoTox test result: **the levels of chemicals** detected in the compost obtained from leather shavings tanned with CAS 4156-21-2 are comparable to those found in the negative control and **are not of concern.**

## Plant response

**Tomato seedlings grown in compost** containing leather shavings tanned with CAS 4156-21-2 (Sodium 4-[(4,6-dichloro-1,3,5-triazin-2-yl)amino] benzenesulfonate) **performed better than control samples.**

Growth was measured in terms of top growth, plant height and number of leaves.



Compost analyzed according to the Eurofins TerrAttesT methodology.



BLC Leather UK trial data.



# STUDY 2 - Melamine Resins

**Melamine  
Resins**



Improve physical and  
aesthetic leather properties

**The presence of residual free formaldehyde  
and melamine raises significant health and  
environmental concerns**



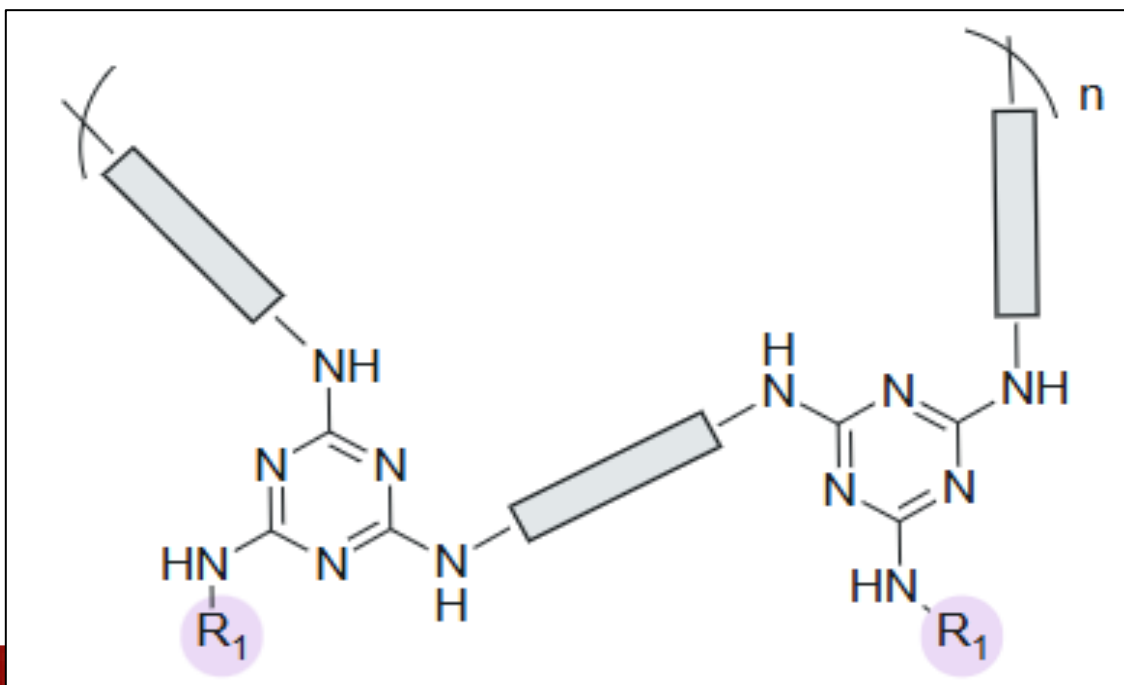
**Toxicity Formaldehyde and  
Melamine**

# STUDY 2 – Melamine resin

Approach to Melamine & Formaldehyde solution

*New Chemistry: New Melamine Resin*

**MELAMINE free**  
**FORMALDEHYDE free**



Classification according to Regulation  
( EC ) No. 1272/2008[CLP/GHS]

# STUDY 2 – Melamine resin

## Leather properties



**Leather**                      **Bovine, wet blue  
Südleder**

**Thickness**                      1,2 mm

**Retanning offer**                      15,0 %

	<b>New Melamine resin</b>	<b>Classical Melamine resin</b>
Tightness	<b>2,5</b>	3,0
Smoothness/Fineness	3,0	3,0
Softness	2,5	2,5
Fullness	2,5	2,5
Fluffiness	2,5	2,5
Handle/Touch	2,5	2,0
Uniformity	2,0	2,0
Shade	2,0	2,0
Bleaching	3,0	2,5
Cross section	70%	50%
<b>Average</b>	<b>2,5</b>	<b>2,4</b>

Score: 1 best; 5 worst

# STUDY 3 –Retanning alternatives

**Syntans**



Improve physical and aesthetic leather properties: e.g. fullness, tightness, softness, and dyeing characteristics.

**Some components, the Bisphenols, have been recognized as SVHC**



Toxicity of Bisphenols

# STUDY 3 – Retanning alternatives

## Milled rice husk as novel non-toxic, renewable retanning agent

- Biological origins.
- Similar or better properties than syntans or vegetable tannins.
- No Bisphenols or Formaldehyde problems.



Composition of rice husk	Av. Percentage
Cellulose	34,0
Hemicellulose	28,0
Lignin	18,0
Mineral ash	17,0
Water	3,0

Composition of rice husk ash	Av. Percentage
SiO <sub>2</sub>	93,0
K <sub>2</sub> O	4,0
MgO	0,9
Al <sub>2</sub> O <sub>3</sub>	0,8
CaO	0,7
F <sub>2</sub> O <sub>3</sub>	0,6

# STUDY 3 – Retanning alternatives

## Leather properties

	Rice Husk	Quebracho	Mimosa
Tightness	3,5	4,0	4,0
Smoothness/Fineness	2,0	2,0	2,0
Softness	3,0	2,0	2,5
Fullness	3,0	2,0	3,0
Fluffiness	3,0	2,0	2,5
Handle/Touch	2,0	2,0	3,0
Uniformity	2,5	2,0	3,0
Shade	2,5	2,0	3,0
Bleaching	2,0	6,0	4,0
Cross section	100%	100%	100%
<b>Average</b>	<b>2,6</b>	<b>2,7</b>	<b>3,0</b>



**Leather**                      **Bovine, wet blue  
Südleider**

Thickness                      1,2 mm

Retanning offer                      15,0 %

Score: 1 best; 6 worst



# STUDY 4 – D4,D5,D6 Reduction

Waterproofing  
Wet – End products



Creating a protective hydrophobing barrier that prevents moisture and water from penetrating deeply.

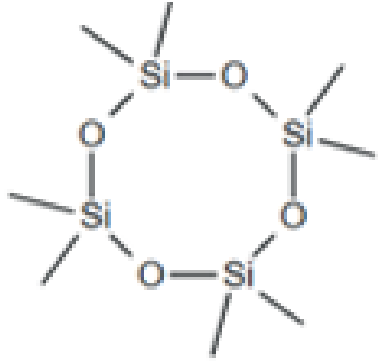
**The presence of residual free D4, D5, D6 causes health and environmental concerns**



**Toxicity D4,D5,D6**

# STUDY 4 - D4, D5, D6 reduction

## Main Cyclic Siloxanes in Wet-End Chemicals

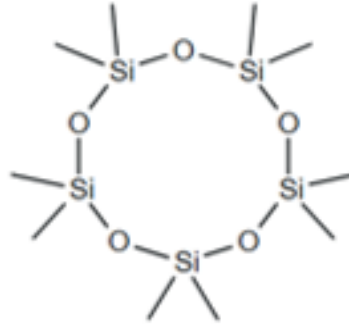


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**Octamethylcyclotetrasiloxane  
(D4)**

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- PBT, vPvB
- Reprotoxic Cat 2B
- SVHC

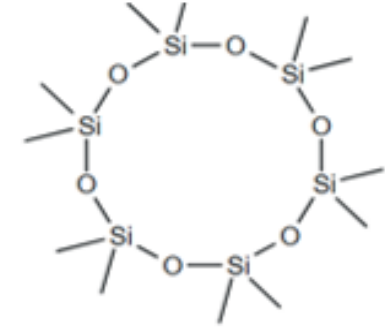


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**Decamethylcyclopentasiloxane  
(D5)**

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- PBT, vPvB
- SVHC



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**Dodecamethylcyclohexasiloxane  
(D6)**

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- PBT, vPvB
- SVHC

# STUDY 4 - D4, D5, D6 reduction

Wiped Film Evaporator Stripping application



	D4 (ppm)	D5 (ppm)	D6 (ppm)
Silicon oil a) before treatment	1668	5059	3852
Silicon oil b) before treatment	1955	4890	4652
Silicon oil a) after treatment	5	<5	51
Silicon oil b) after treatment	13	7	25
WATERPROOFING CHEMICAL COMPOSITION	< 10	<10	<10

# CONCLUSIONS

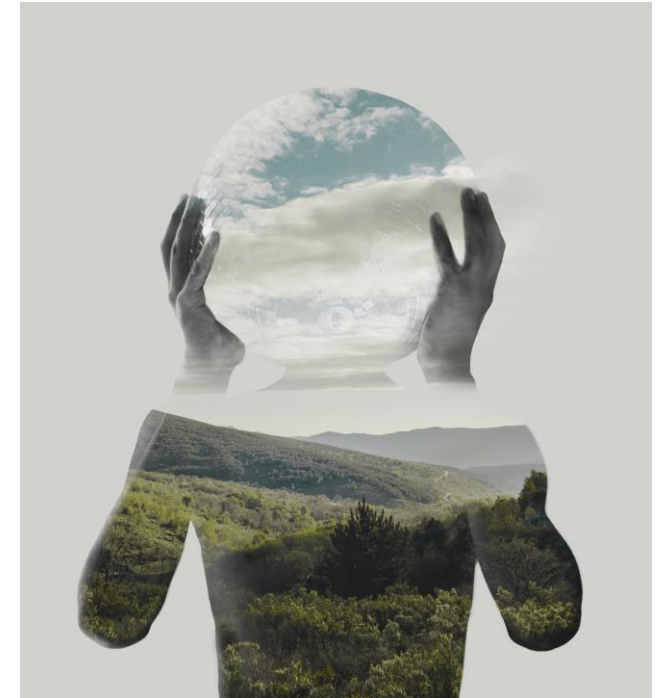
The role of the ongoing detoxification in modern leather chemical industry

More **healthy** for both planet  
and humanity

Highly **performing**

More **sustainable**

More **benefits** for producers,  
**consumers**, and the  
**environment!**





# Thank You

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