VERSION 1.0

MANAGEMENT OF REGULATED CHEMICALS IN ANODIZING & HARD ANODIZING PLANTS

Presented by

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Management of Regulated Chemicals

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Environmental Regulations are becoming more and more complex and can be broadly classified into the following major categories:

- **Air borne chemicals**
- **Presence of certain chemicals in coatings**
- **Chemicals in waste water in plants**

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Air Borne Chemicals

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These would typically include fumes from the Etch Tank, Bright Dip Tank & Anodizing Tank

VOC from solvents used in the masking process.

Both of these can me managed by readily available technologies.

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Presence of certain chemicals in coatings

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Regulations such as ELV & ROHS are designed to prevent the presence of certain chemicals in land fills if & when components are disposed.

The burden is placed on the consumer and so suppliers of goods are requiring that such chemicals do not exceed the limits as specified by ROHS & ELV

Presence of certain chemicals in coatings

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As it relates to ELV & ROHS the biggest potential for anodizing shops comes from the following:

Chromate Conversion Coatings

Dichromate Sealing

Chrome Metalized Organic Dyes

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Chemicals in waste water plants

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This is by far the most difficult area of waste management as it relates to anodizing and/or hard anodizing plants.

Areas that are potential sources of regulatory attack are

Deoxidizer

Chromic Acid Anodizing

Organic Dyes

Sealing Methods

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Chemicals in waste water plants

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Deoxidizers

Although very rare these days chromic acid deoxidizers can and are being used and Hexavelant chrome which is the main ingredient can be a risk form all aspects of regulations

ELV & ROHS Regulations

Air Borne Hazard

Waste water effluent discharge.

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Chemicals in waste water plants

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Chromic Acid Anodizing

Once again this method of anodizing is rare but still being done is come plants and such anodizers would have to deal with all of the following regulations:

ELV & ROHS Regulation

Air Borne Hazard

Waste Water Effluent

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Organic Dyeing; Choice of Dye

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This is a significant area of concern since most of the high performance dyes are metalized with Chrome. The silver lining in the use of chrome metalized dyes is the fact that most basic manufacturers of dyes for anodizing will make sure that the chrome used is trivalent and not hexavalent

Organic Dyeing; Choice of Dye

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There are several dyes that are available and for the purpose of this paper we will discuss Black dyes only because they contain the most chrome and if they can be managed the other colors should not pose a problem

Organic Dyeing; Choice of Dye

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Several factors are considered when a black dye is selected.

- Suitability for both anodizing and hard anodizing
- Response to bleeding in sealing process
- Light Fastness
- Heat Fastness
- Sensitivity to contamination

Organic Dyeing

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Suitability for dyeing anodizing and hard anodizing

Not all dyes that perform well on anodizing perform well on hard anodizing and so it is not uncommon for selection criteria to be for dyes that perform well on hard anodizing.

- This could limit the level of chrome in the dye
- The bleeding characteristics of the dye in sealing
- Shade of dye

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Response to Bleeding During Sealing

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Some dyes do not bleed in any sealing solution but are limited in performance particularly as it relates to light fastness, heat fastness and strikability

Other dyes bleed less in hot nickel seals but more in cold seals

Yet others bleed less in both hot nickel seals as well as cold seals but not so in hot water

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Response to Bleeding During Sealing

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With the desire to eliminate and/or reduce nickel in effluents newer non-nickel seals have been developed that perform well as it relates to seal quality but they have limited applicability with organically dyed parts. The next few slides will show the level of bleeding that can occur using different sealing methods with three common dyes in the market.

Bleeding Using Hot Nickel Sealing

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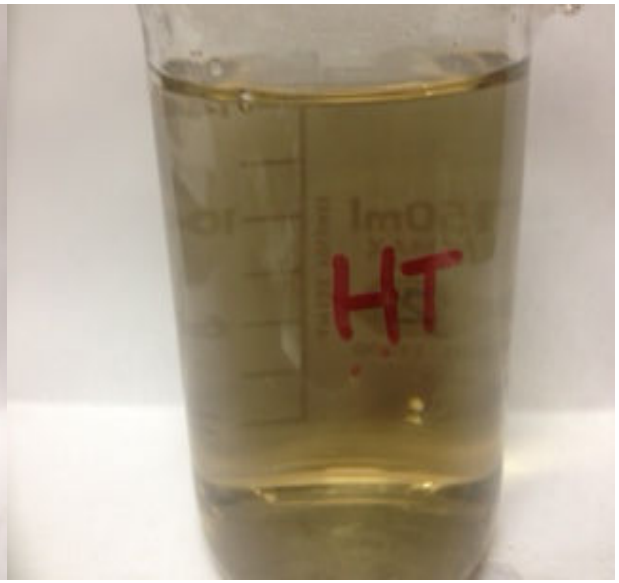
Black Dye 1

Black Dye 2



Black Dye 3

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Bleeding in Mid-Temp Nickel Sealing

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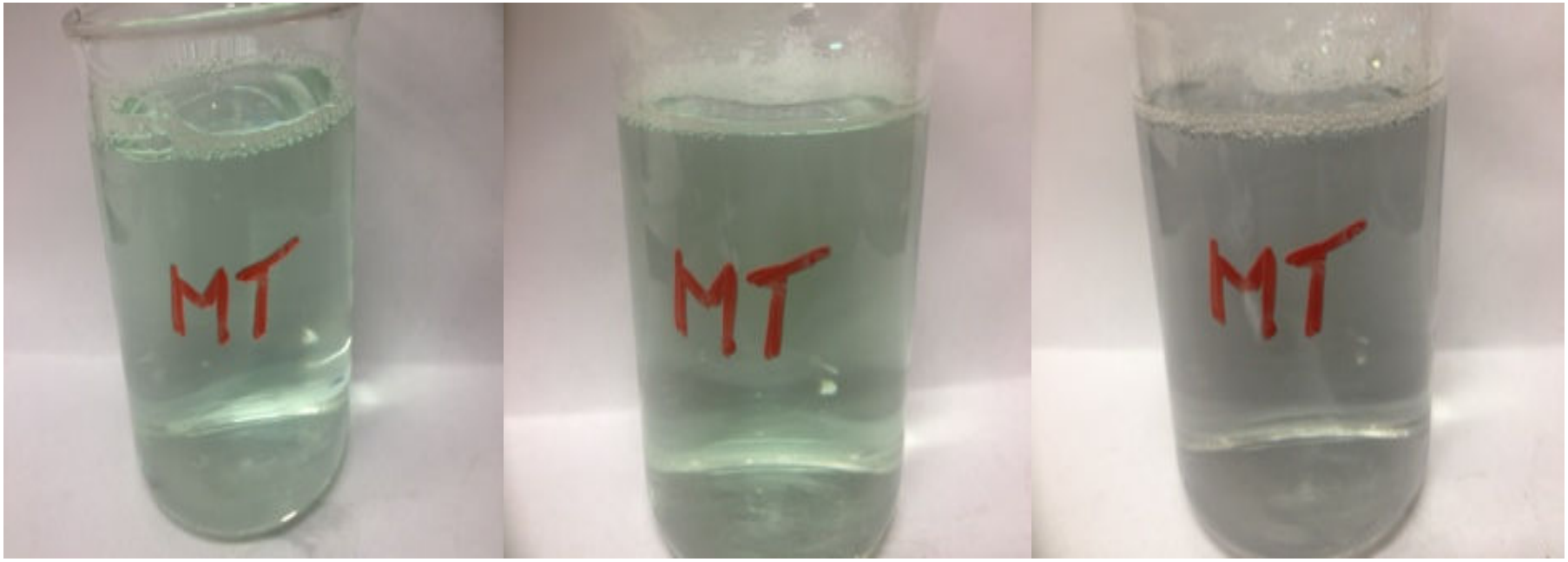

Black Dye 1 | Black Dye 2 | Black Dye 3

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Bleeding in Mid-Temp Magnesium Sealing

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Black Dye 1

Black Dye 2

Black Dye 3

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Bleeding in Mid-Temp Non-Magnesium Sealing

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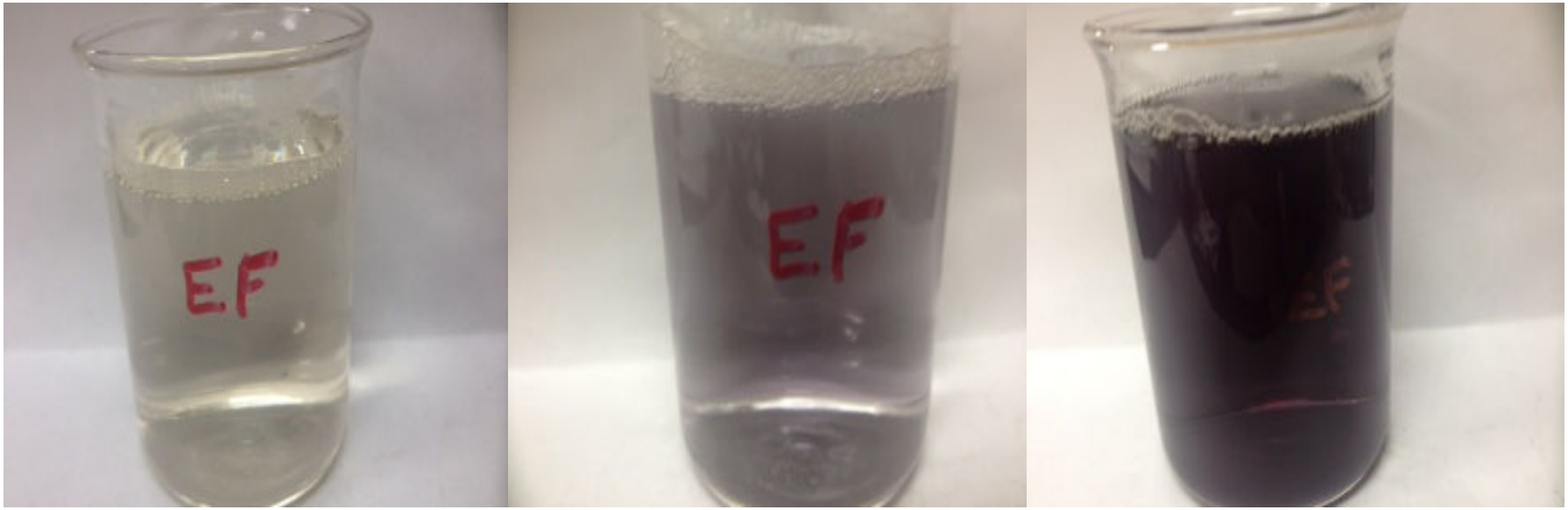

Black Dye 1 | Black Dye 2 | Black Dye 3

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Cold Sealing Solutions: Sealing System 1

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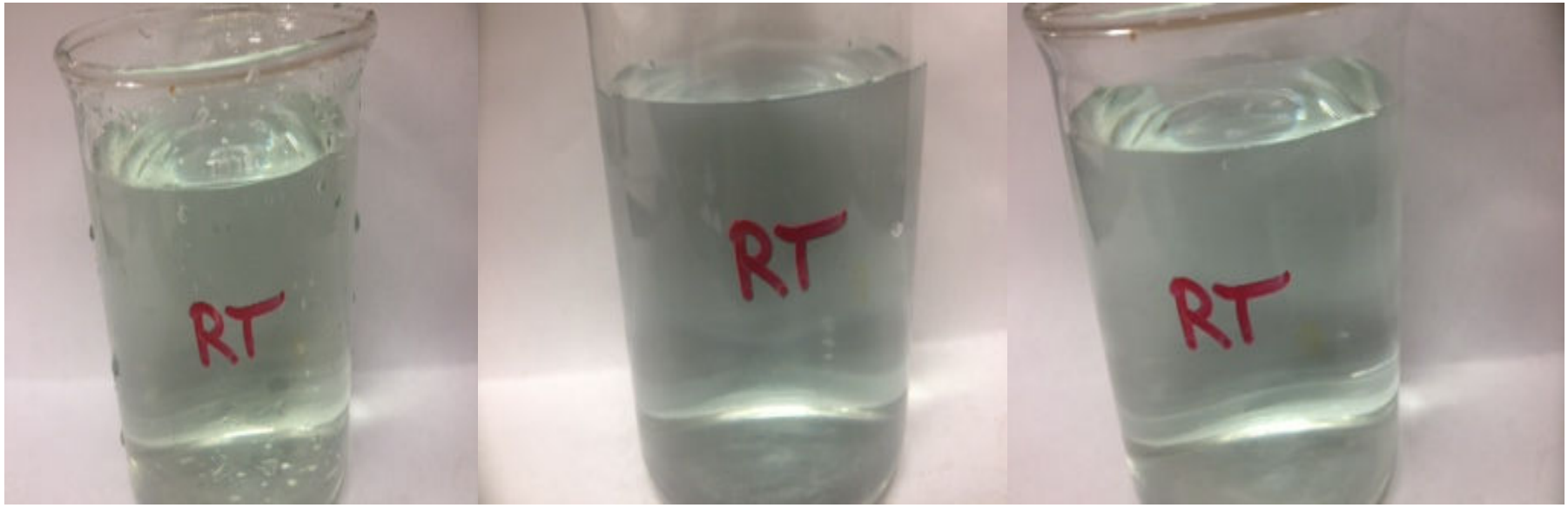

Black Dye 1 | Black Dye 2 | Black Dye 3

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Cold Sealing Solutions: Sealing System 2

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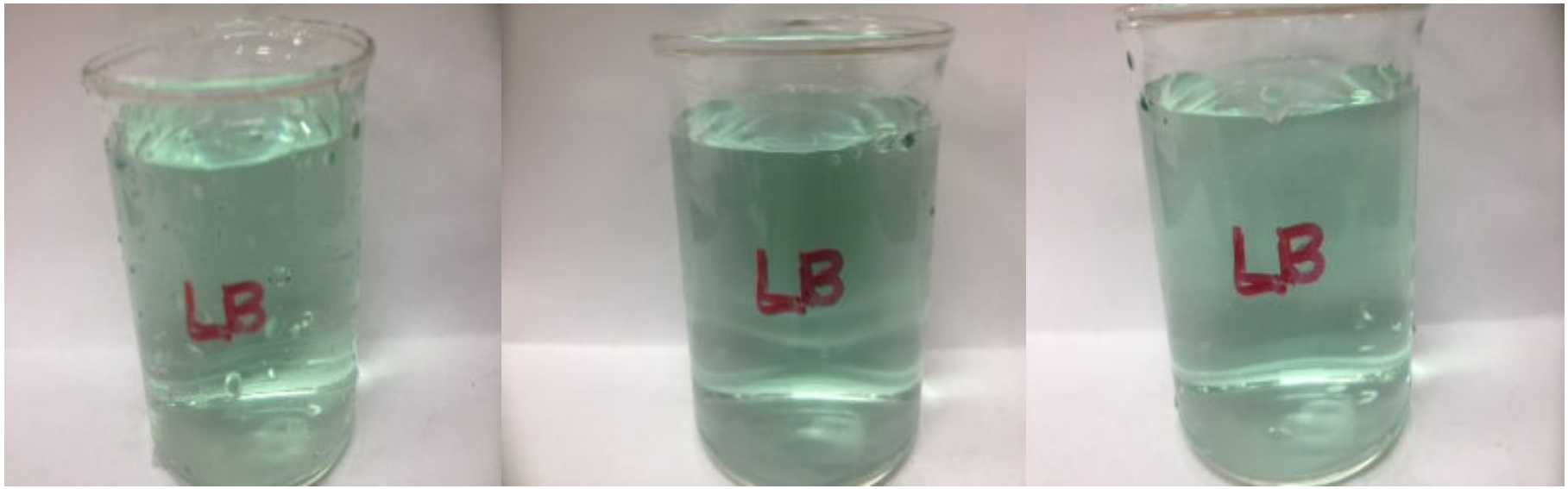

Black Dye 1 | Black Dye 2 | Black Dye 3

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Zero Nickel Discharge Sealing System: Stage 1

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Black Dye 1 | Black Dye 2 | Black Dye 3

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Zero Nickel Discharge Sealing System: Stage 2

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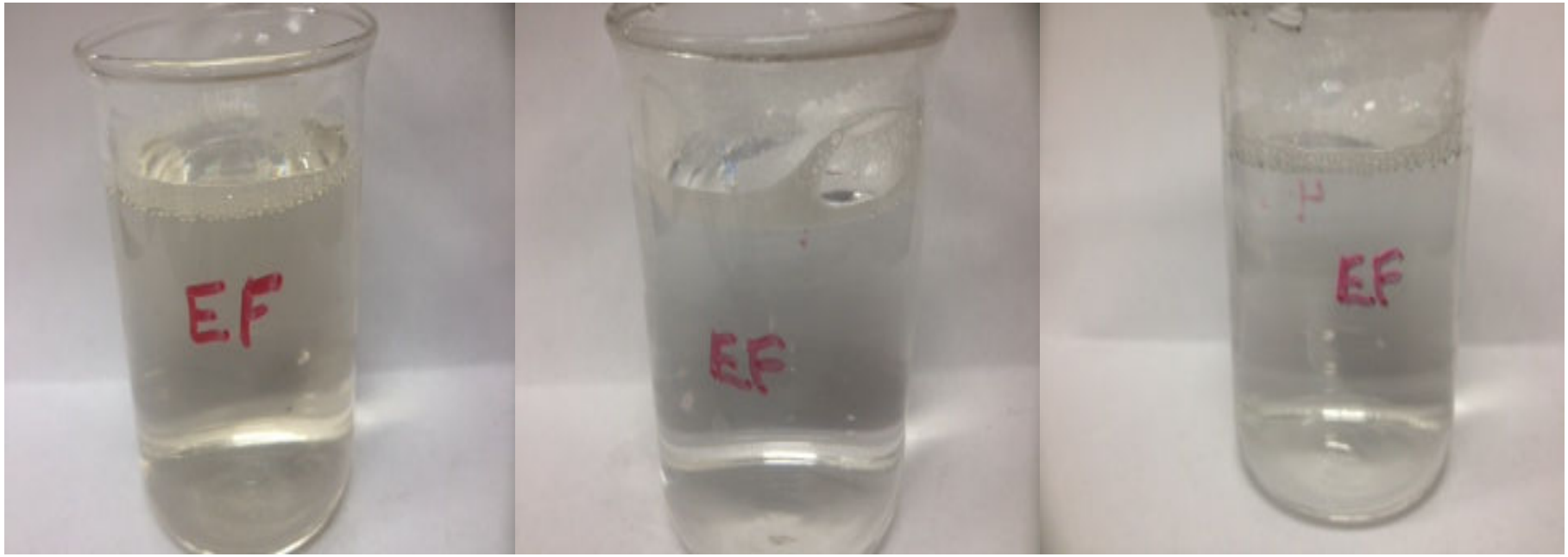

Black Dye 1 | Black Dye 2 | Black Dye 3

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Sealing options to reduce and/or eliminate nickel from effluents

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Option 1

Use conventional nickel seals (High Temperature & Mid-Temperature Seals) and when seal tanks get contaminated with color it can be carbon treated to remove the color.

Disadvantage of this process is that the organics used in sealing baths also get removed and rebalancing the seal formulation is difficult.

Sealing options to reduce and/or eliminate nickel from effluents

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Option 2

Use non-nickel seals that can be disposed frequently with minimum impact to the effluent.

Disadvantages of this is that there are very few dyes than can be sealed with these sealing products without significant color shift.

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Sealing options to reduce and/or eliminate nickel from effluents

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Option 3

Use a cold sealing process that can be continuously carbon treated

One big disadvantage of this is that very few Cold Sealing products will reduce color shift and so although they can be treated color management of the parts will be difficult.

With the correct sealing product this can be a good possibility.

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Sealing options to reduce and/or eliminate nickel from effluents

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Option 4

Use a color fix stage to fix color in stage 1 and follow the sealing with non-nickel sealing products.
There is technology available that allows for continuous carbon treatment of stage 1 that makes it a no dump fix stage.
The second stage which uses non-nickel sealing products can be disposed if needed without any impact on the effluent.

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Conclusions:

It is possible with technology enhancements to run an anodizing plant without having to treat for Nickel in the effluent.

This can be done without compromising the desired color as well as achieving acceptable sealing quality.

In fact it is possible to deploy these technologies and achieve the highly desirable high alkaline resistance sealing processes

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