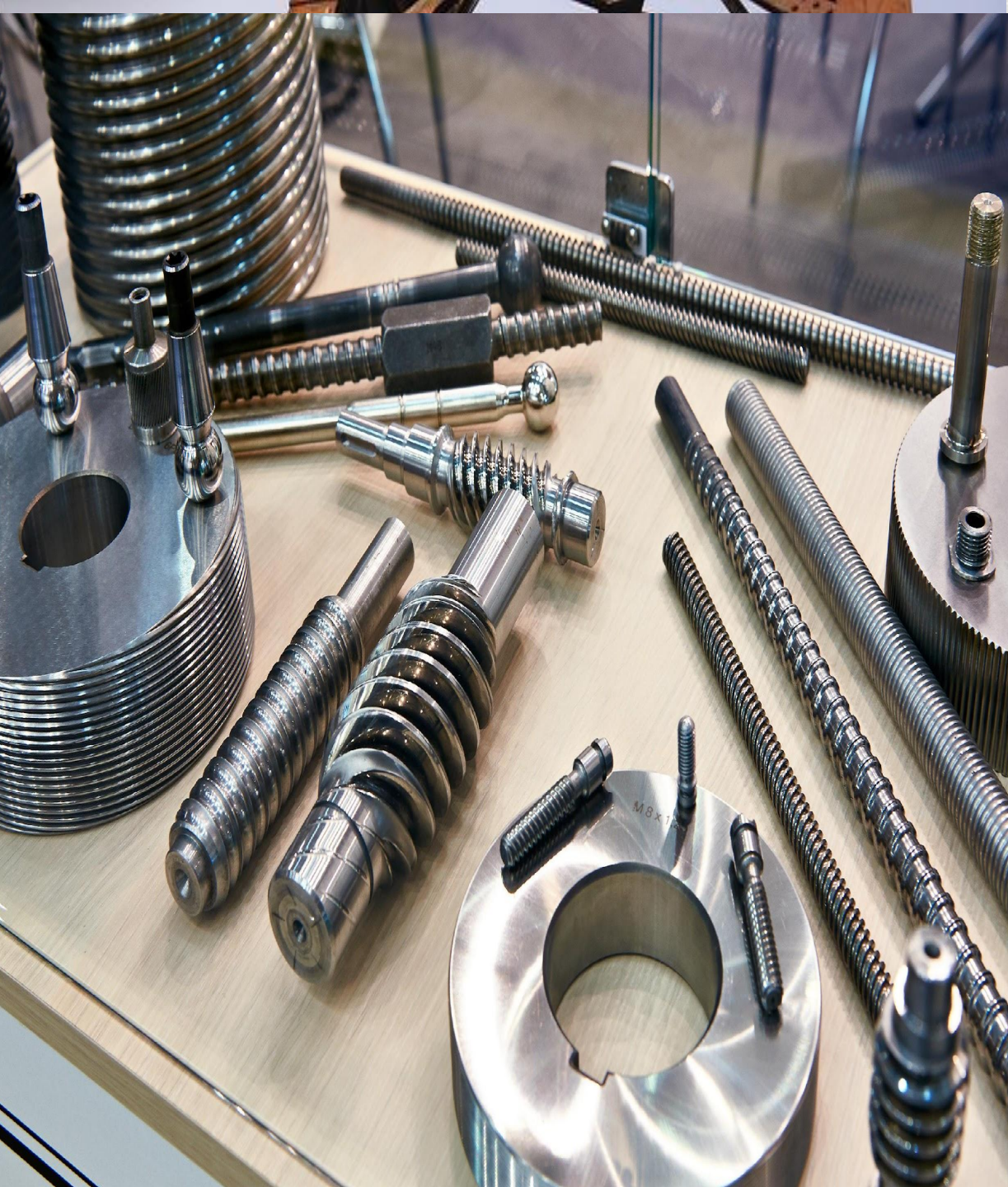


# POLLUTION PREVENTION PRACTICES (P2) IN METAL FINISHING OPERATIONS

Miguel Rodas  
Environmental Compliance Inspector  
(ECI).  
City of Los Angeles,  
LASAN





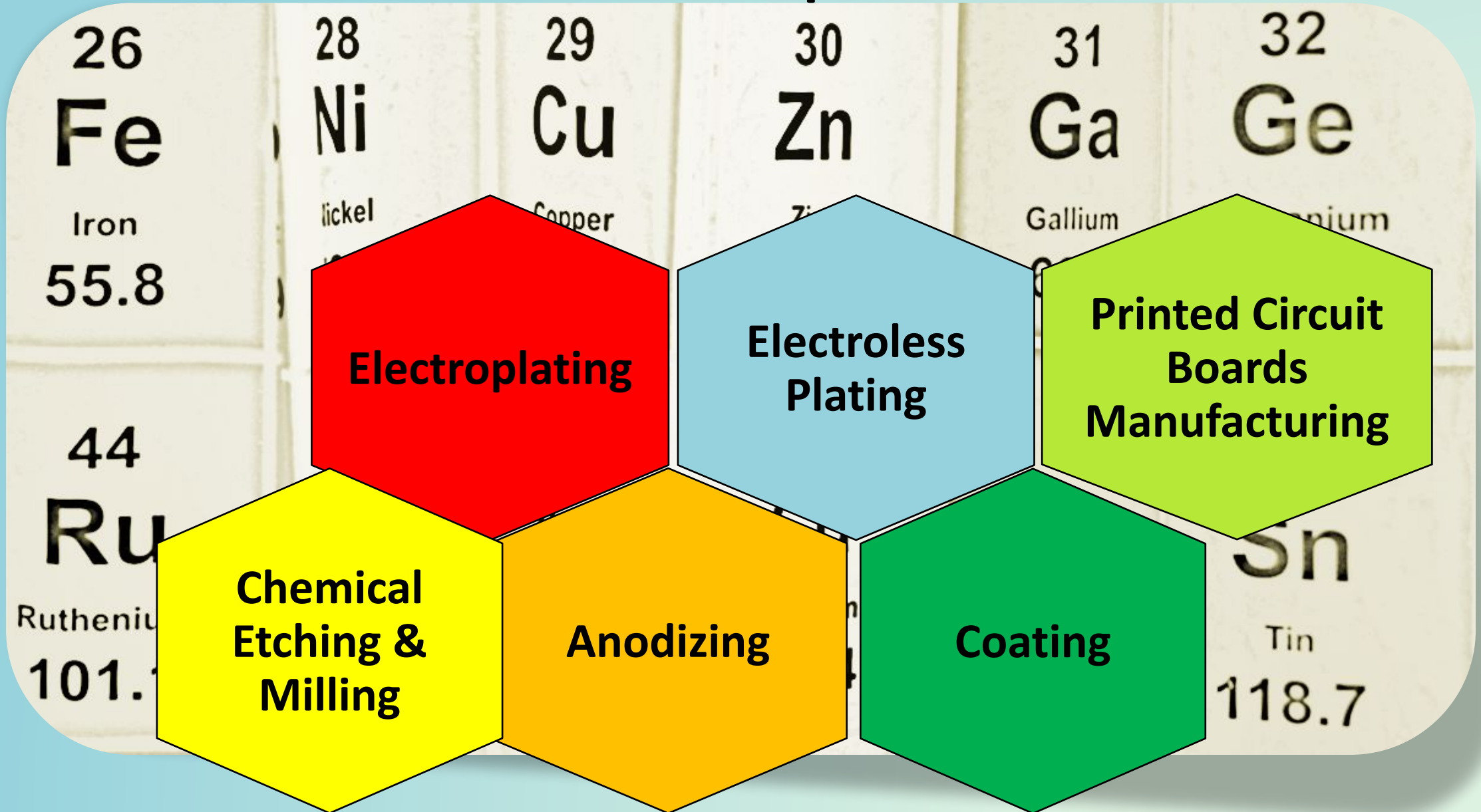
## ❖ The Importance of Metal Finishing.

Its serves an important service for:

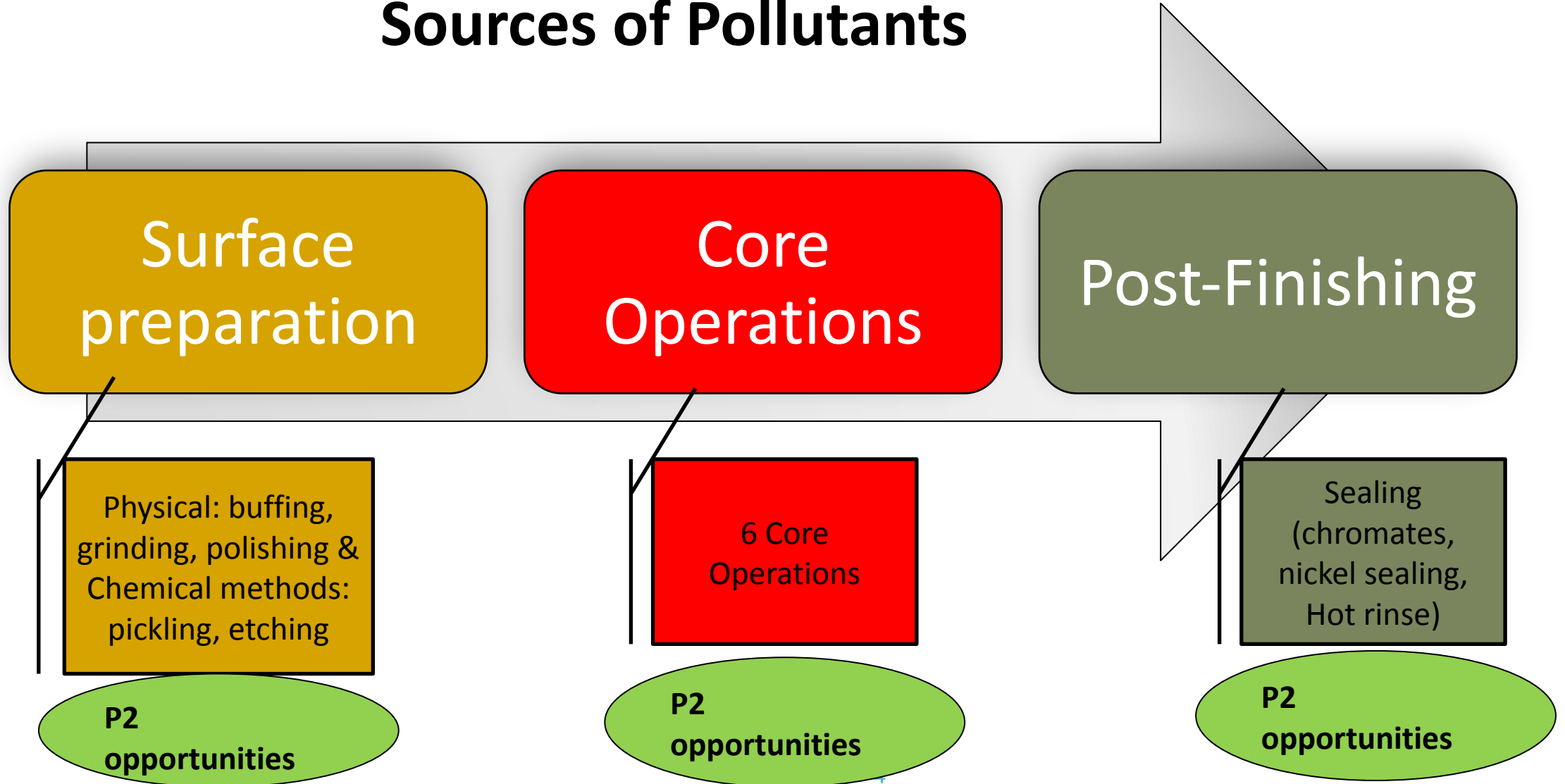
- ❖ Corrosion protection
- ❖ increased friction/hardness,
- ❖ increased conductivity, due to extreme conditions.
- ❖ Decorative/appearance



# The 6 core operations



# Sources of Pollutants





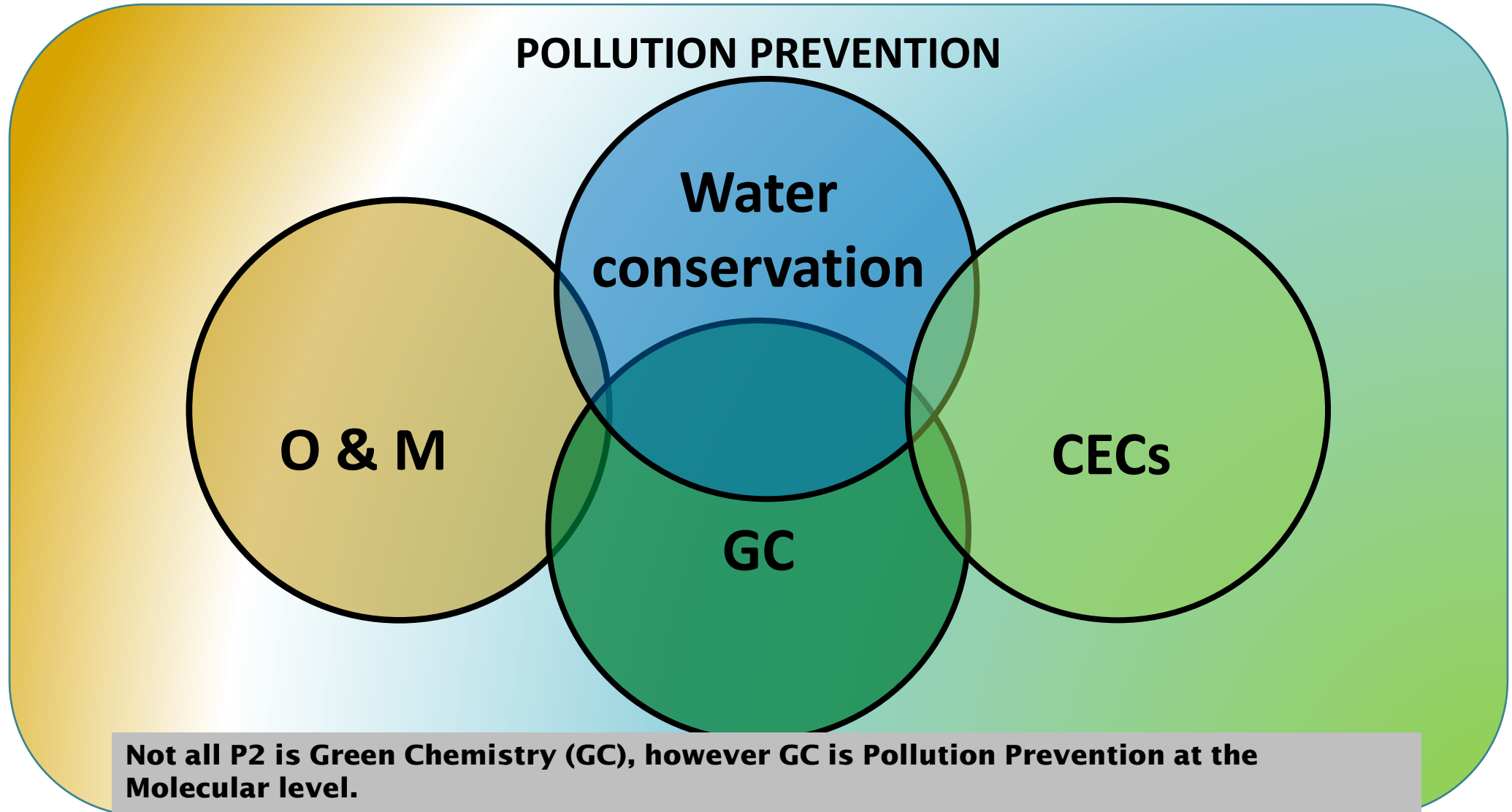
- ❖ Green Chemistry (GC)
- ❖ Finding GC
- ❖ The compartments of the checklist.
- ❖ intersections within the compartments.
- ❖ Benefits of P2

## The Importance of definitions

- ❖ EPA definition
- ❖ The Green Chemistry & Commerce Council (GC3)

- ✓ Raw Materials
- ✓ Chemicals of concern
- ✓ Process changes
- ✓ Manufacturing Practices
- ✓ Operations & Maintenance

# Finding GC: The intersection (Greenness)



# Measuring Greenness

- **Process Substitution**  
(MA TUR = Production unit modification or modernization)
- **Product change/reformulation**

- **Materials Substitution**  
(MA TUR = Input Substitution)

- **Reduction/Elimination of CECs**

Changing one or more process, parameters or equipment used in that process, to reduce the amount of waste generated.

Change or replace existing raw materials used in a process with other materials that produce less waste, or a non-toxic waste in a any medium; Air, Water or Land.

Examine whether their products contain any of the listed “chemicals of concern” and, if so, whether a safer alternative chemical exists.



# Process Substitution or Reformulation/Modification

- Trivalent chemistries
- Zinc/Nickel instead of Cadmium Plating
- Dragout Reduction
- Zirconization instead of phosphating in coating pretreatment
- H<sub>2</sub>SO<sub>4</sub> Anodizing instead of Chromic acid
- Wastestream segregation
- Sand Blasting instead of acid cleaning
- Automated systems (in-line product quality/changes in operating settings)

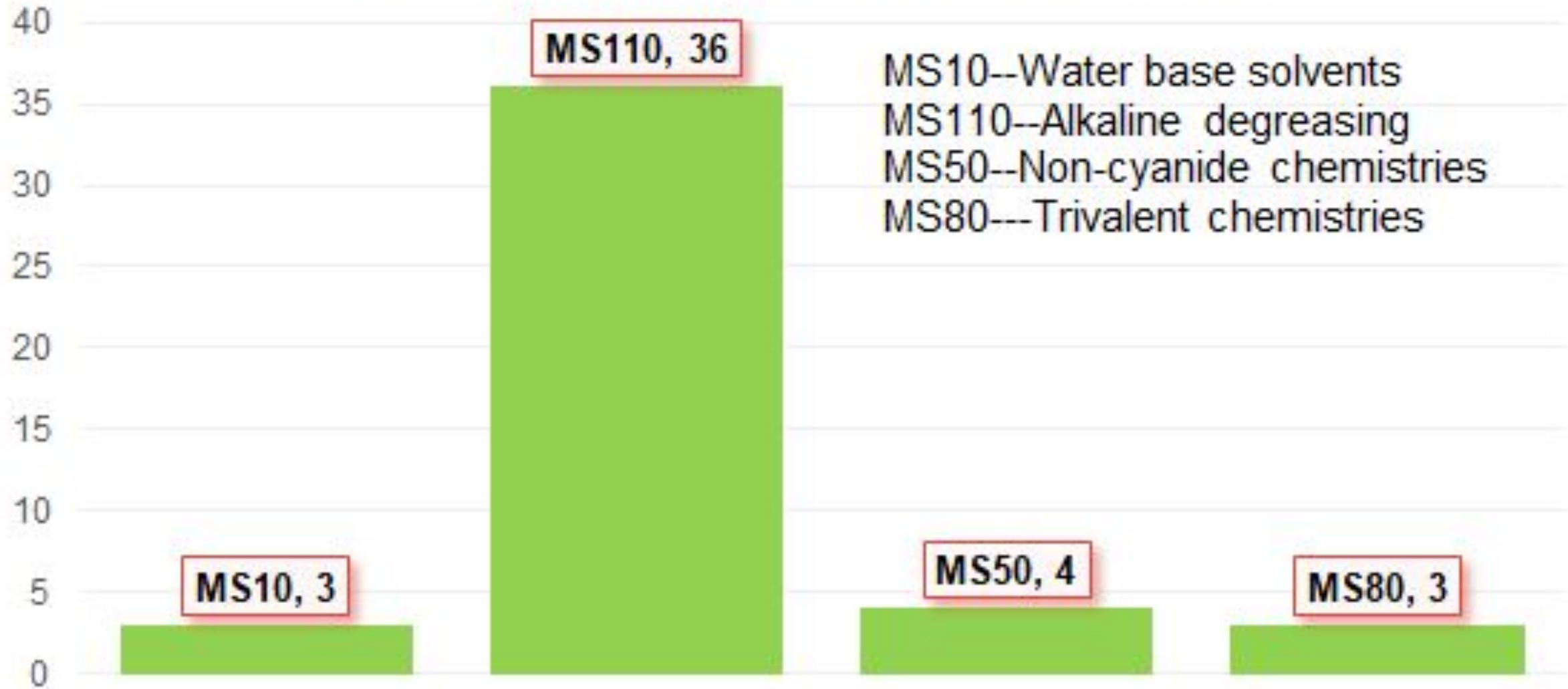
# Material or Chemical Substitution

- Alkaline degreasing instead of organic solvents
- Water based (non-halogenated) solvents
- Non-cyanide chemistries
- Ultrasonic cleaning
- Trivalent chemistries

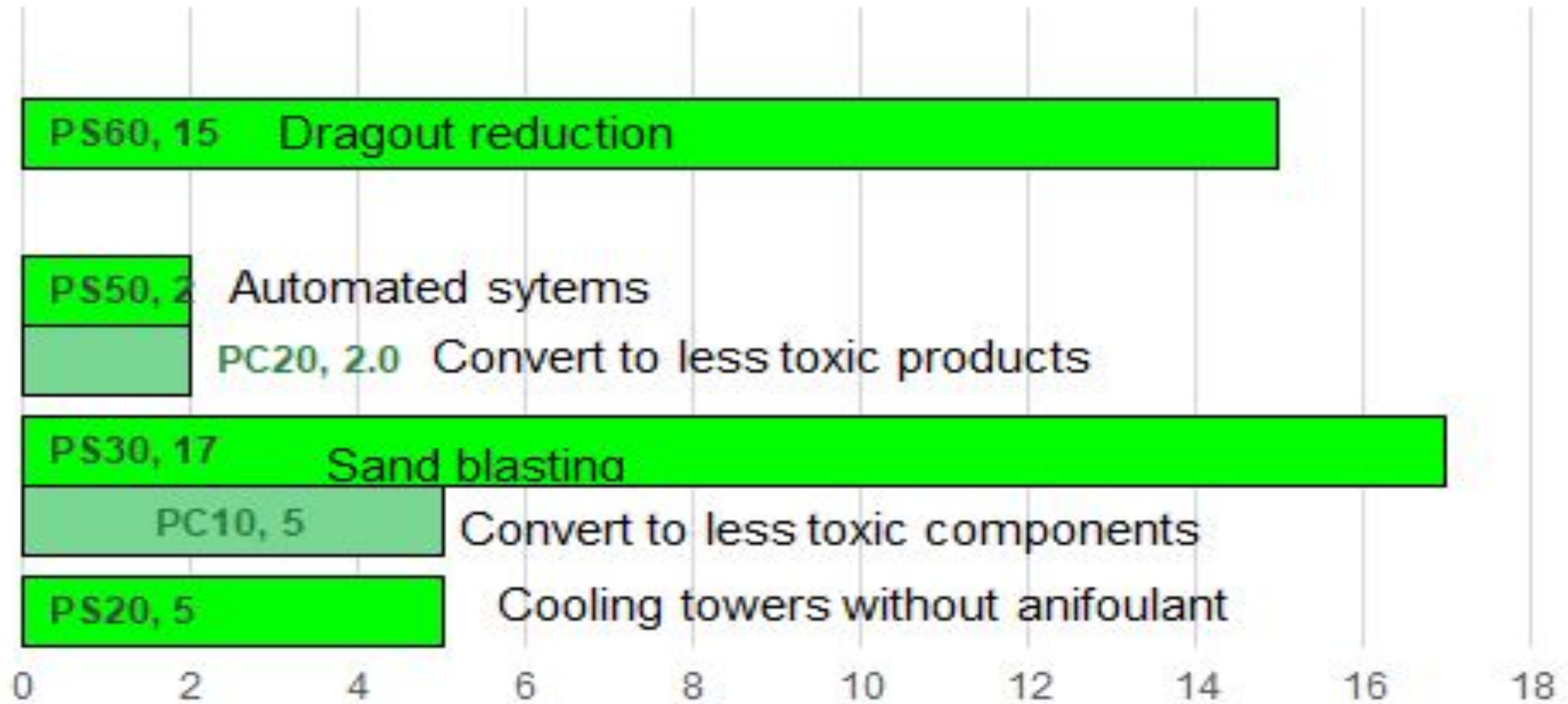
# Elimination/reduction of CECs

- ❑ Hex-chrome free baths
- ❑ Tin Plating instead of lead
- ❑ Elimination of Cadmium from plating operations
- ❑ Cyanide free
- ❑ Carbonate based developers instead of 1,1,1, trichloroethane or Caustic instead of dichloromethane




# MATERIAL SUBSTITUTION



# Process Substitution & Product Change



# Benefits of P2-The take away

Benefits	Type of benefits
<b>Economic</b> 	<ul style="list-style-type: none"><li>▪ Cost effective</li><li>▪ Reduce raw material loss</li><li>▪ Financial impact of Rejects/rework</li><li>▪ Recovery of precious bath constituents</li><li>▪ Water, Energy, Chemicals</li></ul>
<b>Regulatory</b> 	<ul style="list-style-type: none"><li>❖ End of pipe treatment</li><li>❖ Waste generation</li><li>❖ Disposal</li></ul>
<b>Liability</b> 	<ul style="list-style-type: none"><li><input type="checkbox"/> Workers Compensation</li><li><input type="checkbox"/> Health &amp; Safety</li></ul>

# References

<https://greenchemistryandcommerce.org/>

***Measuring Progress Towards Green Chemistry***

<https://www.epa.gov/eg/metal-finishing-effluent-guidelines>

<https://dtsc.ca.gov/environmental-chemistry-lab/chemicals-of-emerging-concern/>