

Coloring technology

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Introduction

Coloring treatment is currently carried out for various things such as metals, plastics, paper, fibers, rubber, glass, food, liquids such as drinking water, and even smoke. Painting containing pigments is common for coloring methods, but there are other coloring methods that use dyes or involve chemical reactions. Though coloring treatment is often intended for improving appearance, it is also used for optical components to suppress reflection and absorb light, and for functional components to improve corrosion resistance and prevent deterioration, and also for identification.

We mainly sell coloring agents for metallic materials. This paper presents the technical of these agents.

Product Summary

The coloring technology of JASCO for metals can be classified into three of oxide film formation, film deposition, and dye.

Features

- There are few dimensional errors in oxide film formation, film deposition, and dye.
- It is possible to easily improve the appearance of the product by coloring.
- It is also possible to provide added value other than improvement of appearance, such as improvement of corrosion resistance, prevention of deterioration, and identification.
- Each of them has a lot of field results.

Treatment process

The treatment process varies depending on the material and the treatment content. Here are some examples.

Example 1) In a stainless steel blackening for forming an oxide film, a treatment is performed in the following step.

Degreasing → Activation → Blackening →
(Rust preventive oil) → Drying

Example 2) In the blackening of zinc die casting which becomes film deposition, a treatment is performed in the following step.

Degreasing → Activation → Blackening → Neutralization
→ Drying

Example 3) In coloring with dye, for example, in the case of anodic oxidation of aluminum, dyeing is performed after anodization, and then sealing is performed.

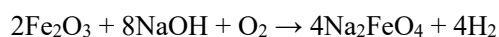
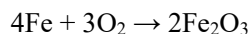
Anodization → Dyeing → Sealing → Drying

*In the above three examples, water rinsing is performed between each step except the post-process of the rust preventive oil.

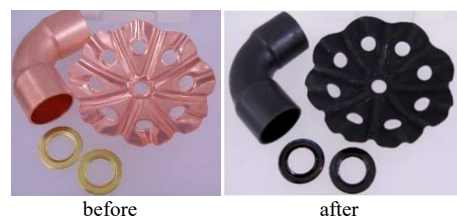
Mechanisms

The coloring technology by oxide film formation is explained with an example.

In the blackening of stainless steel, after removing the oxide film on the surface of stainless steel, the iron on the material is oxidized to Triiron tetraoxide (Fe₃O₄), forming a black film.

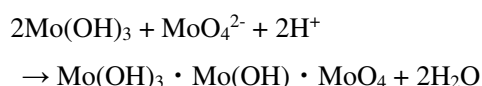
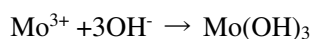
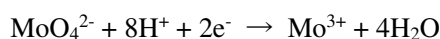
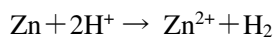


In addition, in the blackening of copper, the surface is oxidized to Copper oxide (CuO), forming a black film.

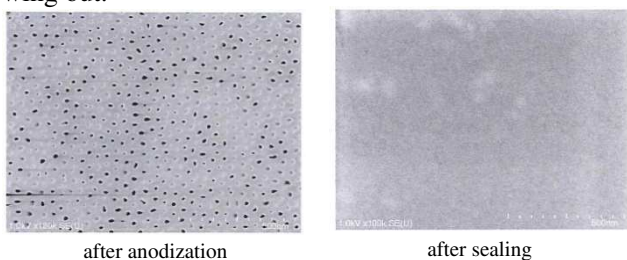


Photograph 1: Blackening of copper

Coloring by film deposition is a technology to precipitate and color metal salts on the material surface. For example, in a blackening in which molybdenum is deposited on zinc, zinc is dissolved by immersing a zinc workpiece in a molybdic acid-sulfuric acid solution, and molybdate ions are reduced by the generated hydrogen. And lastly a molybdenum-based coating containing molybdenum hydroxide as a main component is formed.



Coloring by dye is a technology for coloring by impregnating the pores of alumite or a chemical conversion film having cracks on the surface with dye because it is difficult to deposit directly on the surface of the metal. In alumite, a process for blocking the pores (sealing treatment) is performed thereafter to prevent the dye from flowing out.



Photograph 2: Aluminum surface magnification: 0.1 million×

Table 1: Lineup of Coloring Agents

Product name	Purposes	Mechanism	Remarks
H-540	Alkaline type blackening agent for stainless steel	Oxide film formation	-
5G172	Blackening agent for copper	Oxide film formation	-
MF-325	Blackening agent for zinc die casting	Film deposition	Molybdenum contained type
5K022	Blackening agent for steel	Oxide film formation	-
JASCO color	Dyeing agent after post-treatment on galvanizing	Dye	Yellow, pink, etc.
5E158	Black dyes for anodic oxide coating on aluminum	Dye	-
5C011	Electrolytic blackening agent for aluminum	Film deposition	Molybdenum contained type , cathode electrolysis

In closing

There are various kinds of coloring technology of JASCO depending on the material and purpose, and it has many results. In addition to the general processing method, it is also possible to intentionally stop the coloring reaction in the middle to obtain an appearance that has deteriorated over time.

Thus, it is possible to meet a wide range of needs by accumulating know-how on agent selection and processing methods.