

Non-Cyanide Electrolytes for Gold Plating – A Review

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Nowadays, the cyanide and ferrous cyanide solutions are used in practice for gold plating. The traditional baths employed for soft gold as well as hard gold plating contain the cyanide complex, $[\text{Au}(\text{CN})_2]^-$, as the source of gold, which release free cyanide ions during the plating. Those compounds are very toxic, and formation and maintenance of cyanide baths is expensive and risky for technical personnel; also, they attack photoresists used to delineate circuit patterns and bonding pads. Due to this reason, and especially in modern time, there is a trend of using the electrolytes without content of cyanides. These electrolytes are mainly based on some organic compounds. This article is an overview of the non-cyanide electrolytes for gold plating introduced into practice or only tested in the laboratory. The large number of investigated complexes fulfils the coating quality requests, but there are problems related to their stability. Decorative gold plating obtained from classic cyanide electrolyte and an electrolyte based on mercaptotriazole have shown similar characteristics such as microhardness, surface roughness, visual appearance and adhesion. At the same time, this bath remained stable in a period of at least nine months.

Keywords: Electroplating, Gold baths, Stability constants, Complexing ligands, Photoresists, Soft gold

1. INTRODUCTION

The history of gold deposition began in the early nineteenth century when many art objects were electroplated with gold. It has been traced to the early work of Brugnatelli in 1805 [1]. Gold electroplating formulations based on the double salt gold potassium cyanide was patented in 1840. Since then, many types of gold formulations have been produced to meet the market requirements. Due to the changing trends in fashion, the application of certain colours or shades of the electroplated gold can only last for about forty years [2, 3]. The electronics industry began its development in the 1940's and 1950's; during this period, platters faced new demands for deposits with different properties,

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Table of Contents Plating Recipe Cyanide Gold Surfactant

1. Understanding the eBook Plating Recipe Cyanide Gold Surfactant
 - The Rise of Digital Reading Plating Recipe Cyanide Gold Surfactant
 - Advantages of eBooks Over Traditional Books
2. Identifying Plating Recipe Cyanide Gold Surfactant
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Plating Recipe Cyanide Gold Surfactant
 - User-Friendly Interface
4. Exploring eBook Recommendations from Plating Recipe Cyanide Gold Surfactant
 - Personalized Recommendations
 - Plating Recipe Cyanide Gold Surfactant User Reviews and Ratings
 - Plating Recipe Cyanide Gold Surfactant and Bestseller Lists
5. Accessing Plating Recipe Cyanide Gold Surfactant Free and Paid eBooks
 - Plating Recipe Cyanide Gold Surfactant Public Domain eBooks
 - Plating Recipe Cyanide Gold Surfactant eBook Subscription Services
 - Plating Recipe Cyanide Gold Surfactant Budget-Friendly Options
6. Navigating Plating Recipe Cyanide Gold Surfactant eBook Formats
 - ePub, PDF, MOBI, and More
 - Plating Recipe Cyanide Gold Surfactant Compatibility with Devices
 - Plating Recipe Cyanide Gold Surfactant Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Plating Recipe Cyanide Gold Surfactant
 - Highlighting and Note-Taking Plating Recipe Cyanide Gold Surfactant
 - Interactive Elements Plating Recipe Cyanide Gold Surfactant
8. Staying Engaged with Plating Recipe Cyanide Gold Surfactant

- Joining Online Reading Communities
- Participating in Virtual Book Clubs
- Following Authors and Publishers Plating Recipe Cyanide Gold Surfactant
- 9. Balancing eBooks and Physical Books Plating Recipe Cyanide Gold Surfactant
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Plating Recipe Cyanide Gold Surfactant
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Plating Recipe Cyanide Gold Surfactant
 - Setting Reading Goals Plating Recipe Cyanide Gold Surfactant
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Plating Recipe Cyanide Gold Surfactant
 - Fact-Checking eBook Content of Plating Recipe Cyanide Gold Surfactant
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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