

1

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**MIRROR BRIGHT GOLD ALLOY ELECTRO-
PLATING**

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3 Claims. (Cl. 204-43)

This invention relates to a process and composition for the production of mirror bright alloy gold.

Among the objects of the invention is to provide a process and composition for electroplating a pale yellow gold alloy layer of any desired thickness onto a basis metal.

Among other objects of the invention is to provide a process and composition for electroplating a mirror bright pale yellow gold alloy layer of any desired thickness onto a basis metal.

Heretofore the cyanides of nickel, cobalt, silver or cadmium have been added to gold cyanide solutions to provide electrolytes which under certain conditions are capable of producing flash deposits having a desirable pale yellow color. However, deposits of over a few millionths of an inch in thickness became dull and required scratch-brushing or buffing to produce a satisfactory luster.

One phase of this invention is based on the discovery that an antimony compound can be added to a gold cyanide electroplating bath to produce a pale yellow gold alloy deposit under certain conditions. Ordinarily the addition of an antimony compound to a gold cyanide electrolyte solution produces an electrodeposition having a dull gray or black appearance depending on the conditions of operation and the concentrations added. The condition under which a pale yellow deposit from such a combination is obtained according to the present invention is that a proportion of a polyhydric alcohol be added to the electroplating bath.

Another phase of the invention is based on the discovery that when an anionic surface active or wetting agent is added to the gold cyanide bath containing the antimony salt and polyhydric alcohol the yellow alloy gold deposits become mirror bright. The electrodeposits upon highly buffed mirror-bright surfaces maintain the brilliance up to and over .001 of an inch in thickness. Even upon unfinished or scratch-brushed surfaces, the deposit tends to build brightness or to "level" as the thickness of the deposit increases.

Suitable antimony compounds which may be added to the bath include antimony oxide, antimony tartrate, etc.

Suitable polyhydric alcohols include glycerol, sorbitol, diethylene glycol, mannitol, etc.

The anion active wetting agent added to produce the mirror bright surface may be a sulfonated oil such as sulfonated castor oil, another sulfonated vegetable oil, a sulfonated mineral oil, etc.

Other conventional components of the gold cyanide plating baths such as alkali metal cyanides and free alkali metal hydroxide may be added to the bath.

The range of proportions of the components, per gallon of water, is as follows:

Potassium cyanide	4 to 16 oz.
Potassium gold cyanide	
(67% Au)	0.5 to 4 oz. (troy).
Potassium hydroxide	2 to 6 oz.
Antimony salt	0.02 to 0.5 oz. (calculated as antimony).
Polyhydric alcohol	30 to 120 cc.
Anion active wetting agent	10-90 cc.

2

The bath is operated under the following conditions:

Temperature	70° F.-90° F.
Current density	2-6 amperes/sq. ft.
Agitation	Moderate to rapid.
Time	As required.
pH	11.5 to 13.7.

The invention both as to its organization and its method of operation together with additional objects and advantages thereof will best be understood from the following description of specific embodiments thereof.

Example 1

A metal body was prepared for plating by cleaning and scratch brushing. The body was made the cathode in a bath containing the following ingredients per gallon of water.

Potassium cyanide	oz.	12
Potassium gold cyanide	oz.	¹ 1.5
Potassium hydroxide	oz.	4
Potassium antimonyl tartrate	oz.	1.25
Glycerol	cc.	80
Sulfonated castor oil	cc.	10

¹ Troy.

The bath was operated at a temperature of about 80° F. and at a current density of 5 amperes per square foot. At this current density, .001" of yellow gold was deposited on the body in approximately 90 minutes. The bath was rapidly agitated during the plating. Even though the surface of the body was finished only by scratch brushing, the gold plated surface had a fairly bright appearance.

Example 2

The process was conducted as in Example 1 except that a polished steel body was used as the basis metal.

After plating for 35 minutes at a current density of 4 amperes per square foot, a mirror bright layer of gold 0.0004" thick was deposited on the body.

The features and principles underlying the invention described above in connection with specific exemplifications will suggest to those skilled in the art many other modifications thereof. It is accordingly desired that the appended claims shall not be limited to any specific feature or details thereof.

I claim:

1. A process for the electrodeposition of gold which comprises electrolyzing a gold cyanide bath containing, per gallon, the following ingredients within the range of proportions specified:

Potassium cyanide	oz.	4 to 16
Potassium gold cyanide	oz.	¹ 0.5 to 4
Potassium hydroxide	oz.	2 to 6
Antimony compound (calculated as antimony)	oz.	0.02 to 0.5
Polyhydric alcohol	cc.	30 to 120
Sulfonated vegetable oil	cc.	10 to 90

¹ Troy.

to form a bright yellow gold deposit.

2. A process for the electrodeposition of gold which comprises electrolyzing a gold cyanide bath containing, per gallon, the following ingredients within the range of proportions specified:

Potassium cyanide	oz.	12
Potassium gold cyanide	oz.	¹ 1.5
Potassium hydroxide	oz.	4.0
Potassium antimonyl tartrate	oz.	1.25
Glycerol	cc.	80
Sulfonated castor oil	cc.	10

¹ Troy.

to form a bright yellow gold deposit.

3. An electrolyte for depositing bright, pale yellow gold coatings consisting of an aqueous solution containing per gallon of water, 4 to 16 oz. of potassium cyanide, 0.5 to 2.5 oz. (troy) of potassium gold cyanide, 2 to 6 oz. of potassium hydroxide, 0.02 to 0.5 oz. of a soluble antimony compound calculated as antimony, 30 to 120 cc. of polyhydric alcohol and 10 to 90 cc. of sulfonated oil.

5

References Cited in the file of this patent

UNITED STATES PATENTS

2,113,517	Powell et al.	Apr. 5, 1938
2,654,702	DeLong	Oct. 6, 1953
2,735,808	Greenspan	Feb. 21, 1956
2,800,439	Fischer et al.	July 23, 1957
2,801,960	Seegmiller	Aug. 6, 1957
2,814,589	Waltz	Nov. 26, 1957
2,823,176	Breining et al.	Feb. 11, 1958