

1

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AQUEOUS ACID CHLORIDE ELECTROPLATING BATHS

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3 Claims

ABSTRACT OF THE DISCLOSURE

It has been found that upon the addition of hydroxylamine or an acid salt of hydroxylamine to an aqueous, acid chloride, zinc electroplating bath containing benzylidene acetone as a brightening agent, a characteristic oil stain effect on the surface of the electrodeposit is eliminated.

BACKGROUND OF THE INVENTION

This invention pertains to an improvement in the electrodeposition of bright zinc from aqueous, acid chloride plating baths. More specifically, this invention relates to the use of an additive which corrects a problem or condition encountered in plating baths using benzylidene acetone as a brightening agent.

Benzylidene acetone is a very common and very important additive in acid chloride zinc electroplating baths. When used in combination with other ingredients it adds brightness to a very wide current-density range. But most distinctly, it adds a great deal of brightness and luster to very low current-density areas such as deep recesses and threads of bolts and screws.

After plating baths containing benzylidene acetone are electrolyzed for a short period of time, an oil stain effect appears on the surface of the electrodeposit. This iridescent stain occurs at a current-density of about 30 to 50 amps per square foot. A stained part, of course, usually causes the part to be rejected by quality control inspectors. This problem occurs mainly in rack plating processes, but does appear occasionally in barrel plating processes also.

This oil stain is caused by an oil-like break-down product that is being formed in the plating bath through electrolysis. This oil cannot be removed by carbon treatment, zinc dust treatment, or filtration. Previous to this invention, the only method of overcoming the staining problem was to emulsify this oil by adding a suitable surfactant to the plating bath. The surfactants that are effective in this manner are high foamers and considerable problems are caused in an industrial plating operation. The foam can get so bad that it rolls right out of the plating tank onto the floor and over the equipment. Since the plating bath is corrosive to steel, it is very undesirable to let it come in contact with any expensive equipment. In addition to this problem, the oily break-down product keeps building up in the plating bath until it reaches a level where it cannot easily be emulsified. At this point the only solution is to dilute the plating bath. This is of course a troublesome and expensive procedure, and causes considerable waste treatment problems since the extra bath obtained must be disposed of.

The present invention eliminates the oil staining and avoids the above mentioned problems. I have discovered that the careful addition of hydroxylamine or an acid salt of hydroxylamine to the plating bath removes this staining effect immediately. The oil is converted to a non-offensive substance which either precipitates or is eventually removed by electrolysis. By using this corrective method, there is no troublesome foaming and no build up of harmful chemicals in the plating bath.

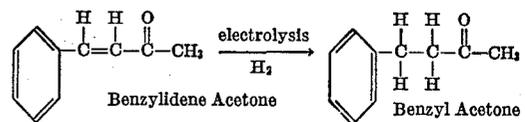
2

SUMMARY OF THE INVENTION

This invention relates to the use of an additive comprised of from about 1 to 100 to 100 to 1 parts by weight of hydroxylamine or an acid salt of hydroxylamine for eliminating oil-staining of electrodeposits obtained from aqueous, acid chloride, zinc electroplating baths containing benzylidene acetone as a brightening agent.

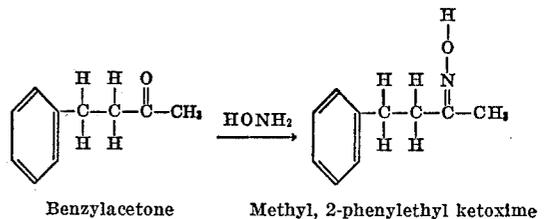
DETAILED DESCRIPTION

When aqueous, acid chloride, zinc electroplating baths containing benzylidene acetone are electrolyzed during normal use, a considerable amount of benzyl acetone is formed according to the following equation:



When the benzyl acetone reaches a level of about 0.2 gm./liter of plating bath, an oil stain appears on the plated work at a current density of about 30 to 50 amperes per square foot.

The addition of hydroxylamine is believed to function in the plating bath as follows:



A portion of the oxime precipitates out of the plating bath and can be removed by filtration. The oxime remaining in solution is not detrimental and is probably removed eventually by electrolysis.

While the additive used in accordance with the corrective method of this invention is effective in a wide variety of aqueous, acid chloride, zinc electroplating baths containing benzylidene acetone as a brightening agent, it is preferred to use any of the basic baths described in the following examples. It will be understood that the following examples are just illustrations and are not meant to limit the use of the invention to these bath compositions only.

EXAMPLE I

Bath composition:	Concentration in gms./liter
Zinc chloride	30
Ammonium chloride	200
pH=5.	

EXAMPLE II

Bath composition:	Concentration in gms./liter
Zinc chloride	60
Ammonium chloride	150
pH=6.0.	

In addition to the basic chemicals listed above, the baths should contain from about 0.05 gm. to about 1 gm. of benzylidene acetone per liter and about 0.5 gm. to 20 gms. per liter of one or more commonly used addition agents such as naphthol polyoxyalkylates, straight chain polyoxyalkylates, and polymeric aliphatic amines.

The hydroxylamine or acid salt of hydroxylamine should be added on an equimolar basis or fraction thereof

3

with respect to the amount of benzylacetone present in the plating bath.

The concentration of benzylacetone can conveniently be determined by conventional gas chromatographic techniques.

Having thus described this invention in such full, clear, concise and exact terms, as to enable any person skilled in the art to which it pertains to make and use the same, and having set forth the best mode contemplated of carrying out this invention, I state that the subject matter which I regard as being my invention is particularly pointed out and distinctly claimed in what is claimed, it being understood that equivalents or modifications of or substitutions for, parts of the above specifically described embodiment of the invention may be made without departing from the scope of the invention as set forth in what is claimed.

What is claimed is:

1. In the process of electroplating zinc from an aqueous, acid chloride, zinc electroplating bath containing benzylidene acetone as a brightening agent, the improvement which comprises preventing oil staining of the deposited zinc by adding to the bath an amount of hy-

4

droxylamine, or an acid salt thereof, which is equimolar to the amount of benzyl acetone in the bath.

2. The process set out in claim 1 which additionally includes the steps of determining the concentration of benzyl acetone in the bath before the hydroxylamine, or an acid salt thereof, is added to the bath, to facilitate the addition of the proper amount of hydroxylamine or an acid salt thereof.

3. The process set out in claim 1 wherein the hydroxylamine, or an acid salt thereof, is added to the bath after oil staining of the deposited zinc has appeared, and said hydroxylamine, or an acid salt thereof, to eliminate said oil staining.

References Cited

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GERALD L. KAPLAN, Primary Examiner