Florida CirTech
LEADERS IN PCB TECHNOLOGY

Product Data Sheet

ACT Excelplate Electroless Copper

DESCRIPTION

Excelplate Electroless Copper 200 is specially formulated to plate 0.25 microns (10 millionths of an inch) of copper in 10 minutes. This bath is highly stable, easy to replenish and run, and does not plate out during periods of inactivity. It is especially suitable as a low deposit copper for printed circuit board that will be flash electroplated. Electroless Copper 200 is also recommended for plating of ceramics, as the conductive copper film serves as an excellent base for further electroplating.

OPERATING PARAMETERS

Make-Up	EC-200 Part A 10% v/v EC-200 Part B 10% v/v DI Water 80% v/v
Temperature	20 to 30°C (68 to 86°F)
Immersion Time	10 to 30 minutes, as needed
Plating Rate	0.02-0.025 micron/min (0.8-1.0 microinches/min)
Loading ratio	0.1-2.0 sq.ft./gal
Process	Dip tank
Agitation	Required
Ventilation	Required due to the presence of caustic and formaldehyde
Tanks	High density polypropylene, PVC, or fiberglass. Metal tanks may be used with a drop-in PVC liner. An overflow weir and ten micron polypropylene filter bag is required to remove particles and increase bath stabilization
Racks and Baskets Heaters Pumps	Quartz, Teflon coated St. steel, Teflon heat transfer coils Non-metallic and sealless design.

PHYSICAL PROPERTIES

	EC200A	**EC200B**
Specific gravity	1.07 - 1.09	1.28 – 1.31
Appearance (Part A)	Clear blue liquid	Clear to light amber liquid
pH	2.5 – 3.3	>12.0
Odor (Part A)	Formaldehyde	None

CONTROL PROCEDURES

TANK PREPARATION

1. New tanks must be cleaned with a mild detergent to remove all soil and grease. After cleaning, leach the tank with 5% caustic or 10 % EC 200 Part B for 24 hours. Drain and rinse the tank with DI water before use
2. Tanks which have been used for electroless copper plating must be treated to remove all metal deposits. Use a solution 180 g/l ammonium persulfate with 5% sulfuric acid, or 25 % nitric acid. Allow the acid solution to dissolve all of the existing metal and rinse with water. Then rinse with 5% caustic solution followed by DI water before use.

CONTROL ITEMS

1. Continuous filtration during plating is recommended.
2. When tank cleaning is required, transfer the solution through a 10 micron washed polypropylene filter or anode bag. Remove any copper plate with persulfate or dilute nitric acid and rinse thoroughly before returning the electroless copper bath to the clean tank.
3. Maintain the copper concentration at 80-100 % (1.8-2.3 g/l) during plating. Allow the copper concentration to drop to 80 % (<1.8 g/l) or less for overnight storage.
4. The EC-200 bath can be replenished until the plating rate appreciably slows down. For every 10% increase in copper concentration needed, discard 2 % of the working bath volume. Add back 1% by volume EC-200 Part A and 1% by volume EC-200 Part B
5. Normal operation and replenishment is accomplished by addition of one part of EC-200 Part A per one part of EC-200 Part B. This can be accomplished with a colorimetric control unit and automatic feeder pumps. However, it will also be necessary to analyze the bath at least once per day for copper. Once normal usage and addition cycles have been established, copper analysis may be done less frequently.

CONTROL RANGES

Copper	1.8 – 2.3 g/L (80-100% Copper)
NaOH	8.5 – 16 g/L
Formaldehyde	6.0 – 11.0 g/L

ANALYSIS

Analyze the Excelplate Electroless Copper 200 in the order shown and make additions as required.
1.Analyze for copper and add equal parts of EC-200 Part A and EC-200 Part B.
2.Analyze for caustic and formaldehyde and make additions of Liquid Caustic Soda (50%) and ECR – Electroless Copper Reducer as needed.

Reagents and Equipment:

pH meter
0.1 N acid
Sodium sulfite (Na_2SO_3) 120 g/l solution
0.1 N sodium thiosulfate ($Na_2S_3O_7$)
Starch indicator solution
Sulfuric acid, 50 % by volume
Potassium iodide (KI) solution, 20 % by weight or KI powder
Potassium thiocyanate (KSCN) 10 % by weight
Alternately you can use a UV-Vis

Copper Analysis by titration:

1. Pipet 25 ml of the copper bath into a 250 ml flask and add 100 ml DI water.
2. Add 20 mLs of 50% sulfuric acid and mix.
3. Add 20 mLs of 20% potassium iodide and mix.

4. Titrate with 0.1 N sodium thiosulfate until the red color changes to yellow.
5. Add 3-5 mLs of starch indicator solution.
6. Titrate with 0.1 N sodium thiosulfate until the black color starts to fade.
7. Add 20 mLs of 10% potassium thiocyanate solution.
8. Titrate with 0.1 N sodium thiosulfate to a white / cream endpoint.
9. Calculation:

% Copper = (mLs of 0.1 N sodium thiosulfate) x 11.0

For each 10 % of copper that is needed, add 1.0 liter of EC-200 Part A and 1.0 liter of EC-200 Part B per 100 liters of working bath.

Alternate Copper Analysis by UV-Vis:
1. Pipet 25 ml of the copper bath into a 100 mL vol. flask and dilute with DI water.
2. Measure the absorbance at 760 nm using DI water as a blank.
3. Calculation:

% Copper = Absorbance x 200

For each 10 % of Copper that is needed, add 1.0 liter of EC-200 Part A and 1.0 liter of EC-200 Part B per 100 liters of working bath.

Caustic and Formaldehyde Analysis:

1. Pipet 5 ml of the copper bath into the 250 ml beaker and add 100 ml DI water.
2. Titrate the solution to pH 9.5 with 0.1 N acid. Record the number of mLs as 'E'.
3. To the same solution, add 10 ml sodium sulfite solution & mix. Re-zero the buret.
4. Titrate again with 0.1 N acid to pH 9.5. Record the number of mLs as 'F'
5. Calculation

Caustic (g/L) = 'E' x 0.8
Formaldehyde (g/L) = 'F' x 0.6

Add 1.5 mL/L of Liquid Caustic Soda (50%) for every 1 g/L increase in NaOH.
Add 2.5 mL/L of ECR - Electroless Copper Reducer for every 1 g/L increase in formaldehyde.

SAFETY AND STORAGE

Excelplate Electroless Copper 200 Part A contains copper salts and formaldehyde, and is mildly acidic. Do not get in eyes, skin, or clothing. Do not inhale or swallow. The formaldehyde may cause an allergic skin reaction (sensitization) in some persons. Eye contact can cause severe irritation. Use with adequate ventilation and proper protective equipment. Rubber gloves and chemical safety glasses are recommended. Do not eat or drink while handling these products, and wash thoroughly after using them.

Excelplate Electroless Copper 200 Part B is caustic and can cause severe burns. Do not get in eyes, skin, or clothing. Do not inhale or swallow. Use with adequate ventilation and proper protective equipment. Rubber gloves and chemical safety glasses are recommended. If there is eye contact, flush with warm water for 15 minutes. Call a physician for treatment. If there is skin contact, flush thoroughly with water. If the materials are inhaled, remove patient to fresh air and consult a physician. If the materials are swallowed, do not induce vomiting. Consult a physician for any further treatment.

Electroless Copper concentrates should be stored between 10 and 37°C (50 and 100°F). Do not store in direct sunlight. Do not store EC-200 Part B in contact with acidic materials. Do not store EC-200 Part A in contact with alkaline materials or strong oxidizers. Keep containers closed when not in use. Do not cross contaminate containers--always use clean scoops, buckets, and pumps. In case of spill, neutralize EC-200 Part B with sulfuric or hydrochloric acid and flush to drain. In case of spills of EC-200 Part A, cover with absorbent inert

material and mix with solid or dissolved sodium bisulfite to neutralize the formaldehyde, then scoop up the material for disposal of the copper.

WASTE TREATMENT

Used electroless copper solutions can be batch treated to remove the copper. Consult with local officials for waste disposal regulations. Please ask a Florida CirTech technical sales rep. for more information regarding waste treatment of this chemistry and our complete line of waste treatment chemistry if additional help or information is desired.

MISCELLANEOUS

Available in 5-gallon pails and 55 gallon drums.Consult MSDS for additional information.