µChem 520
Acid Copper Electrolyte, Matt

Properties

- process especially developed for micro technology
- deposits matt, fine crystalline copper layers
- very good throwing power
- the deposited layers are low on inner stress and free of pores
- especially suited for feeding mould cavities
- the delivered electrolyte is ready for plating

Application

The process µChem 520 includes the following products:

- µChem 520 Copper Electrolyte
- µChem 520/1 Leveller

make-up values:

µChem 520 Copper Electrolyte		undiluted	
analytical values:	copper	25 g/l	(20 - 30 g/l)
	sulfuric acid	230 g/l	(200-250 g/l)
	chloride	60 mg/l	(50-70 mg/l)
make-up:	The delivered electrolyte is premixed readily and after eventually heating up to higher temperature, it is ready to work.		
temperature:	25°C	(20 to max. 40°C)	
	At current densities above 3 A/dm^2, it is recommended to work at higher temperatures up to 40°C.		
cathodic current density:	3 A/dm^2	1-5 A/dm^2	
anodic current density:	1 A/dm^2	0.5-1.5 A/dm^2	
deposition rate:	0.63 µm/min at 3 A/dm^2		
current efficiency:	approx. 100 %		
anodes:	copper anodes with 0.03-0.06 % phosphor; clippings or bullets in titanium baskets with anode bags out of PP		
agitation:	strong circulation is necessary		
tank material:	out of PP, ceramics or glass		
filtration:	continuously, with 1-5 times the total bath volumes per hour; pore size: 0.2 µm		
heating:	possibility for heating and cooling is necessary, preferable out of titanium or covered with PTFE		
exhaust:	recommended for worker´s protection		

Technical Specification

(at 20°C)	Appearance	Density (g/ml)
µChem 520	liquid, blue	1.187 (1.17-1.20)
µChem 520/1	liquid, colourless	0.995 (0.95-1.05)

Maintenance and Analysis

Compensate evaporation losses with deionised water.

The desired analytical values have to be in their ranges. The content of copper, sulfuric acid and chloride should be analysed once a week.

The content of **sulfuric acid** must not be lower than 200 g/l, to prevent a too low copper dissolution.

The **chloride** content can be measured potentiometrically. A loss of chloride reduces the levelling, an excess of chloride can lead to passive anodes. Missing chloride can be added as hydrochloric acid (2.5 ml HCl correspond to 1 g chloride). An excess of chloride can be precipitated by adding silver sulfate (4.5 g Ag_2SO_4 precipitate 1 g chloride).

µChem 520/1 Leveller is consumed during copper plating. The consumption depends on the throughput (see “consumption”).

Sample Preparation

Take a sample at a homogeneously mixed position. Let it cool down to room temperature.

Copper – Analysis by Titration

reagents:
0.1 M sodium thiosulfate solution
potassium iodide solution (10 %)
sulfuric acid (10 %)
starch solution (1 %)

procedure:
1. Pipette 5 ml bath sample into a 250 ml Erlenmeyer flask.
2. Dilute with 100 ml deionised water.
3. Acidify with 10 ml of the sulfuric acid.
4. Add 10 ml of the potassium iodide solution.
5. Close the flask with a watch glass and wait for 5 min.
6. Add 2-3 ml starch solution.
7. Titrate with 0.1 M thiosulfate solution until the solution turns from blue to turbid white/yellowish.

calculation: consumption in ml · 1.28 = g/l copper

Sulfuric Acid – Analysis by Titration

reagents:
1 N sodium hydroxide solution
indicator: methyl orange solution (0.04 %)

procedure:
1. Pipette 10 ml bath sample into a 250 ml Erlenmeyer beaker.
2. Dilute with 100 ml deionised water.
3. Add 5 drops of indicator solution.
4. Titrate with 1 N sodium hydroxide solution from violet to green-yellow.

calculation: consumption in ml · 4.9 = g/l sulfuric acid

Chloride – Analysis by Titration (potentiometrically)

reagents:	0.01 M silver nitrate solution nitric acid (conc.) silver electrode
procedure:	1. Pipette 50 ml bath sample into a 250 ml Erlenmeyer beaker. 2. Dilute with 100 ml deionised water. 3. Add 10 ml nitric acid. 4. Titrate with 0.01 M silver nitrate solution in steps of 0.5 ml and measure the corresponding change of the potential. Write down the consumption of silver nitrate at the potential drop.
calculation:	consumption in ml · 7.1 = mg/l chloride

Consumption and Stock Keeping

The consumption depends heavily on the drag-out. To determine the exact amounts of drag-out, see SurTec Technical Letter 11.

The following values per 10,000 Amin can be taken as estimated average consumption:

µChem 520/1 Leveller 14-25 ml

In order to prevent delays in the production process, per 1,000 l bath, the following amount should be kept in stock:

µChem 520/1 Leveller 1 kg

Product Safety and Ecology

The safety instructions and the instructions for environmental protection have to be followed in order to avoid hazards for people and environment. The Material Safety Data Sheets (according to European legislation) contain explicit details for this.

The following hazard designations and classifications into water hazard classes (WHC) have to be taken into account:

product	*hazard designation*	*water hazard class*
µChem 520	C - Corrosive N - Dangerous for the environment	WHC 2
µChem 520/1	-	WHC 1

Warranty

We are responsible for our products in the context of the valid legal regulations. The warranty exclusively accesses for the delivered state of a product. Warranties and claims for damages after the subsequent treatment of our products do not exist. For details please consider our general terms and conditions.

Further Information and Contact

In our forum, you can discuss topics of the surface technology:
http://forum.SurTec.com/

If you have any questions concerning the process, please contact your local technical department: http://SurTec.com/International.html

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