Laser® P

Laser P is a hydrogen peroxide-based pickling system which quickly dissolves heavy oxide and oxide scale from copper, bronze, and brass leaving the surface with a light, matte finish which is well suited for subsequent metal plating, soldering, or mechanical polishing. Laser P is used alone or as a pre-treatment prior to chemical polishing in the Laser B bright bath. A working solution is prepared by simply mixing the Laser P with water and Sulfuric Acid.

Features & Benefits

Hydrogen peroxide < 34%	Below reportable limit
Non-fuming	Safer work environment
Fast	Higher productivity
Non-chelated	Easier to waste treat, lower cost
Versatile	Effective on a wide range of copper alloys

Operating Conditions

Solution make-up:

Water	75% by volume
Sulfuric Acid 66° Be’	15% by volume
Laser P	10% by volume
Copper Sulfate	*2 oz/gal

* Needed when stainless steel tank is used.

Note: It is imperative that the tank be thoroughly cleaned and rinsed, particularly if it had contained anything other than a peroxide solution. Ideally, the tank should be leached overnight with a dilute Laser P / Sulfuric Acid solution. Add 2 oz/Gal copper sulfate if a stainless steel tank is used.

Operating Range	8 – 12% by volume Laser P 12 – 17% by volume Sulfuric Acid
Temperature	80°F – 120°F Do not exceed 125°F
Time	1 – 4 minutes
Agitation	Work rod agitation

The laser solution should be cooled below 80°F at the end of the day's production for the most economical and efficient operation.

Equipment

Tanks	PVC, Polypropylene, Polyethylene, 304 or 316 stainless steel
Heaters	Quartz or Teflon heaters
Cooling coils	304 or 316 stainless steel
Ventilation	Required
Fixtures, Racks & Baskets	Polypropylene, PVC, nylon, or stainless steel

Process cycle

It is important that parts be free of dirt and oil prior to being processed through Laser P.

Cycle 1 - (matte finish desired)
1. Alkaline soak clean*, 10 oz/Gal, 160°F, 3 minutes.
2. Cold water rinse.
3. Pickle in Laser P, 115°F, 1 to 4 minutes.
4. Cold water rinse.
5. Dry.

Cycle 2 (pre-pickling prior to chemical polishing)
1. Alkaline soak clean*, 10 oz/Gal., 160°F, 3 minutes.
2. Cold water rinse.
3. Pre-pickle in Laser P, 115°F, 1 to 4 minutes.
4. Cold water rinse.
5. Chemical polish using a Laser polishing bath**, 115°F, 1 to 5 minutes.
6. Cold water rinse.
7. De -smut in 5% by volume sulfuric acid, room temperature, 15 to 60 seconds.
8. Cold water rinse.
9. Dry.

*Please consult your Hubbard-Hall technical product specialist for product recommendations.

For water conservation, rinse water can be counter flowed starting at step 8 and working towards step 4.

Titration Method

The Laser P and Sulfuric Acid concentrations can be easily analyzed and accurately replenished using the following analytical procedures.

Laser P Concentration

1. Pipette a 10 mL sample of the working solution into a 100 mL volumetric flask and dilute to the mark with DI water.
2. Pipette a 5 mL sample of the diluted solution into a 250 mL Erlenmeyer flask and add 75 mL of DI water.
3. Add 5 mL of concentrated Sulfuric Acid.
4. Titrate with 0.1N Potassium Permanganate solution until a pink color remains for 10 to 20 seconds.
5. Record mL used.

Calculation

$$Concentration = mL\ 0.1N\ KMnO_4 \times 0.93$$

For every 1% low in Laser P concentration, add 1.28 fluid ounces of Laser P per gallon of operating solution (10 mL per liter).

The Laser P should be maintained between 8 to 12% by volume.

Sulfuric Acid Concentration

1. Pipette 2 mL sample of the working solution into a 250 mL Erlenmeyer flask.
2. Add 75 mL of DI water.
3. Add 5 drops of Methyl Orange indicator.
4. Titrate with 1.0 N Sodium Hydroxide to a yellow endpoint.
5. Record mL used.

Calculation

$$Concentration\ (H_2SO_4) = mL\ 1.0N\ NaOH \times 1.33$$

For every 1.0% low in Sulfuric Acid, add 1.28 fluid ounces of concentrated Sulfuric Acid per gallon of operating solution. (10 mL per liter).

The Sulfuric Acid concentration must be maintained between 12 to 17% by volume.

Copper Concentration

- Pan Indicator
  Dissolve 0.1 gram of pan indicator (1-(2 pyridylazo) -2 naphthol) in 100 mL of Methyl alcohol.
- 0.0575 M EDTA disodium salt solution
  Dissolve 21.40 grams of EDTA disodium salt in 10 mL of concentrated Ammonium Hydroxide and 100 mL of distilled water, makeup to 1 liter with distilled water.

Procedure

1. Pipette 1 mL of working solution into 500 mL Erlenmeyer flask.
2. Add 2 mL of concentrated Ammonium Hydroxide.
3. Add 100 mL of distilled water and about 4 drops of Pan Indicator.
4. Titrate with 0.0575 M EDTA disodium salt solution until an end color changes from purple to green.
5. Record mL used.

Calculation

$$Copper\ (oz/Gal) = mL\ 0.0575\ M\ EDTA \times 0.48$$

Waste Disposal

Spent solutions contain Hydrogen Peroxide and Sulfuric Acid (although to varying degrees). They will contain dissolved metals - copper, zinc, lead, etc. They do not contain chelators.

Laser solutions can be treated with other waste streams or they can be segregated, and batch treated independently. If a clarifier is used in the separation of solids and liquids, the batch method is preferred. Small gas bubbles produced by peroxide destruction can lift previously precipitated sludge and cause "floaters". If membrane filters, cartridge filters, sand filters, filter presses, etc., are used, then everything can be mixed.

Hydrogen Peroxide is generally unstable on the alkaline side. Since Laser solutions are acidic, they require adjustment with caustic, caustic potash, lime, soda ash, etc. When the pH rises above 8.0, an effervescence will occur. This will vary with the concentration of peroxide. Certain dissolved metals like iron, lead, copper - will accelerate this.

This breakdown should be allowed to run to completion - as evidenced by the absence of gassing. If the dwell time is very short, sodium bisulfite can be used to expedite the process.

When the pH was raised, the various metals will precipitate in their Hydroxide forms. If the Laser solution is mixed with chelate-containing wastes, some can remain in solution. Care should be taken to prevent this.

After metal precipitation and peroxide breakdown are complete, the waste stream can be handled in the normal fashion. The addition of coagulants and flocculants can proceed as normal.

Caution

DO NOT STORE USED LASER SOLTUIONS IN SEALED DRUMS. DISCHARGE USED LASER SOLUTIONS TO WASTE TREATMENT SYSTEMS EQUIPPED TO HANDLE THEM.

Laser P contains hydrogen peroxide. Hydrogen Peroxide is strongly oxidative and acts caustically on the eyes and skin. Self-ignition is possible if the liquid is soaked up by an inflammable material. Protect eyes and skin.

Laser P is a Hydrogen Peroxide mixture and should be stored in original vented container in a dry location, out of sun and away from heat. Empty containers should be diluted with large quantities of water and discarded. A spill or leak should be quickly flushed away by flooding with water.

Avoid contamination from any source, including metals, dust and especially organic materials. Avoid contact with combustible materials. Do not get in eyes - wear goggles. Avoid contact with skin - wear neoprene, butyl rubber or vinyl gloves. Wash thoroughly after handling. Do not breathe mists or vapors; adequate ventilation should be provided.

In the event the Laser P drum begins to vent, immediately apply a cold-water spray to cool the drum. Do not physically handle the drum. Also, contact Hubbard-Hall Inc. for further assistance.

WARRANTY: THE QUALITY OF THIS PRODUCT IS GUARANTEED ON SHIPMENT FROM OUR PLANT. IF THE USE RECOMMENDATIONS ARE FOLLOWED, DESIRED RESULTS WILL BE OBTAINED. SINCE THE USE OF OUR PRODUCTS IS BEYOND OUR CONTROL, NO GUARANTEE EXPRESSED OR IMPLIED IS MADE AS TO THE EFFECTS OF SUCH USE, OR THE RESULTS TO BE OBTAINED.

Our people. Your problem solvers.

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